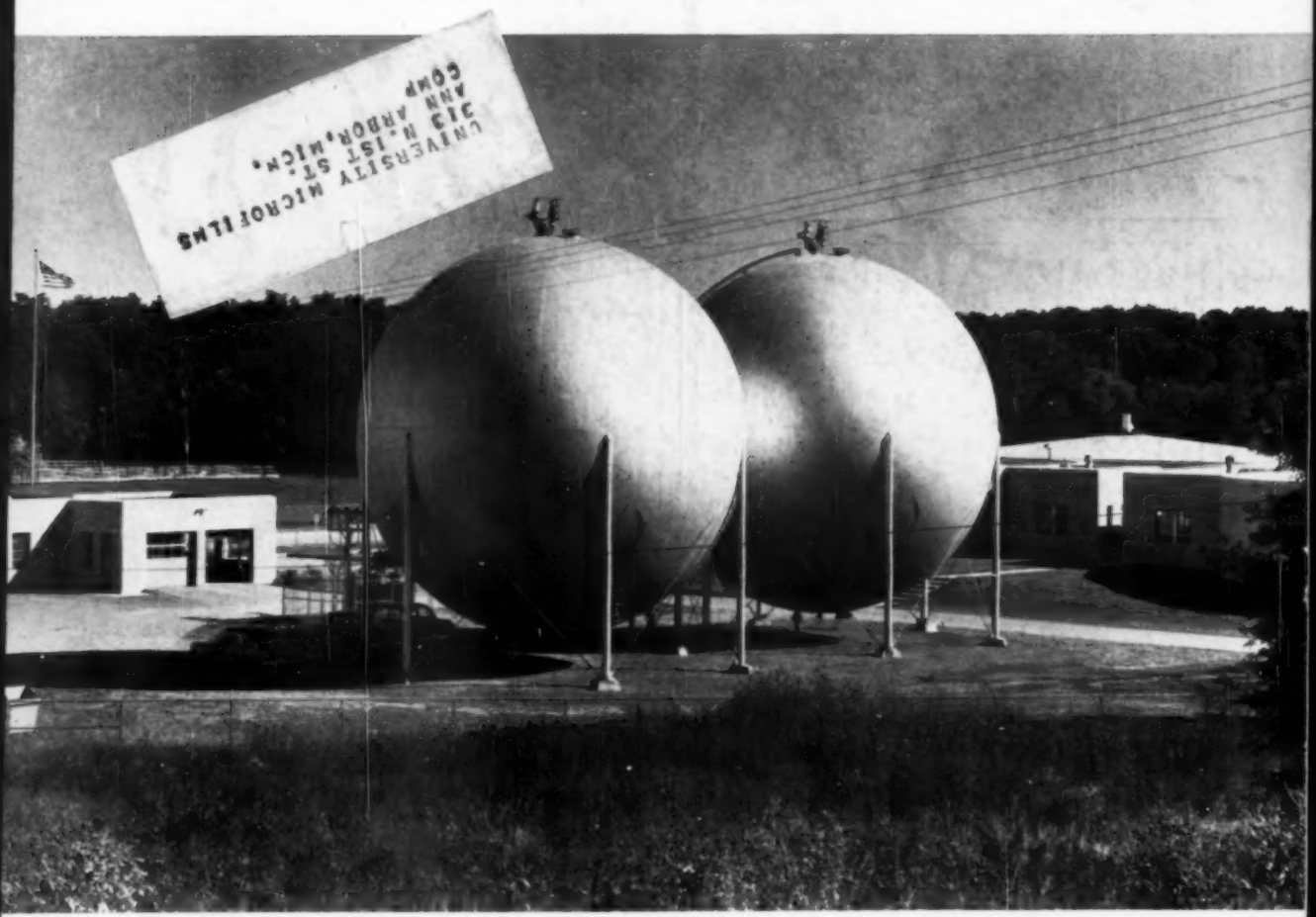
Scranton Gillette Publication

FEBRUARY 1958

WATER & SEWAGE WORKS

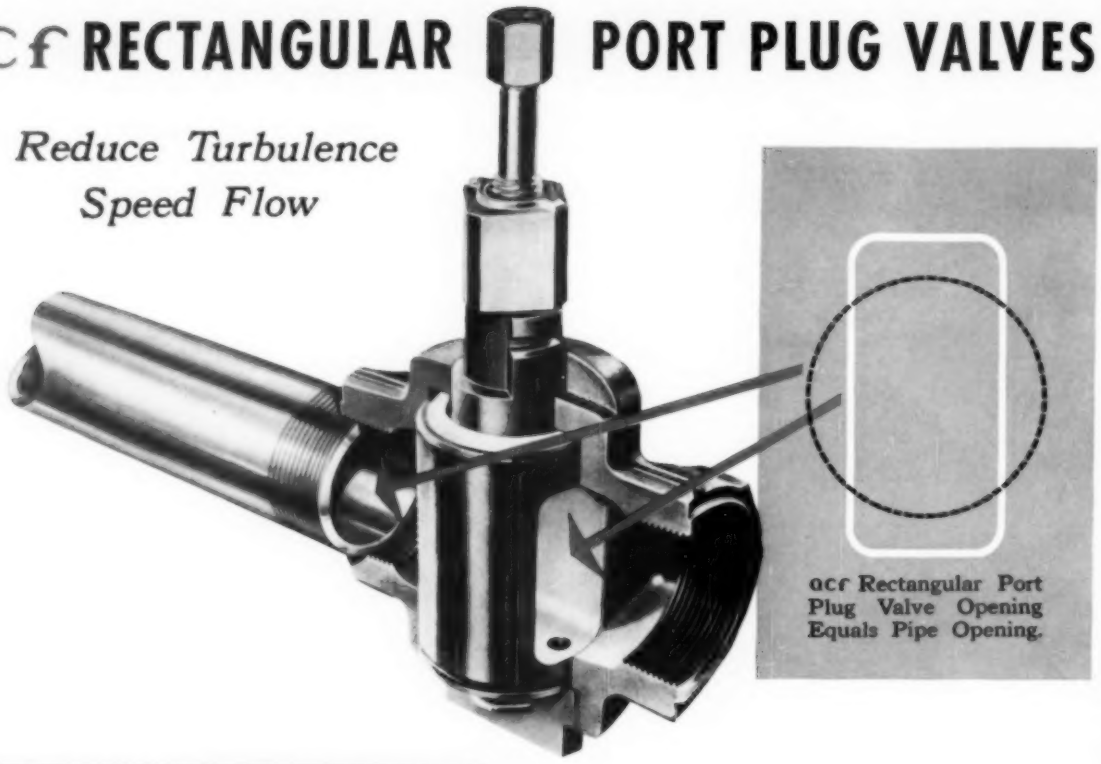


▲ **TWO HORTONSPHERES** for storage of sludge digestion gas at the sewage treatment plant in South Bend, Ind. are 45 ft. in diameter and designed for 40 psi working pressure. Erected last year. See page 47 for the annual review of progress in sewage treatment in 1957.

• Also see "Liquid Alum" p. 61

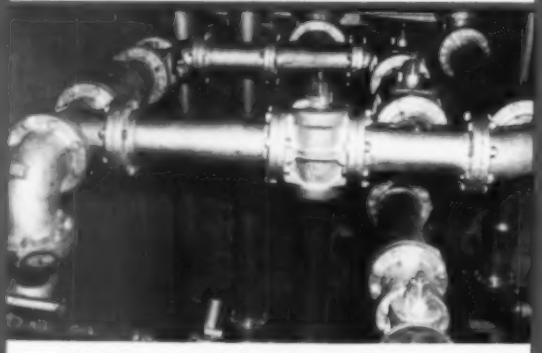
acf RECTANGULAR PORT PLUG VALVES

Reduce Turbulence
Speed Flow



acf Rectangular Port Plug Valve Opening Equals Pipe Opening.

acf Valves on suction lines from digestion tank in sewage treatment plant. There are 130 acf Valves from 3" to 12" in this installation.



acf Valves in sludge control lines to heat exchanger in sewage disposal plant.

Rectangular ports of acf® Lubricated Plug Valves are sized and shaped to provide the nearest approach to the flow efficiency of the pipe itself and still retain the most compact plug valve design.

In addition, the entrance chamber into the port is designed to permit the flow of fluid from pipe through plug with the least amount of turbulence and loss of head pressure.

Maximum flow efficiency is but one of the advantages you receive when you specify acf Lubricated Plug Valves. Others are: tight sealing without wedging or sticking—Teflon* head gasket—quick, quarter-turn opening and closing—precision lubrication—knife-edge shearing action of the plug. They all add up to low maintenance, long life for the industry's finest lubricated plug valve.

acf Valves are available through your industrial jobber or supply store.

W-K-M
DIVISION OF acf INDUSTRIES INCORPORATED

PLANT: MISSOURI CITY, TEXAS
MAILING ADDRESS: P. O. BOX 2117, HOUSTON, TEXAS

*Teflon: tetrafluoroethylene resin. acf is a registered trademark of acf Industries, Inc.

Complete your file of vital valve data—write Dept. S-2 for Catalog 400, containing sizes, pressures, specifications, design and performance factors of ACF Valves.

MANUFACTURERS OF W-K-M GATE VALVES acf LUBRICATED PLUG VALVES
KEY-KAST ALLOY STEEL PIPING FITTINGS KEY RETURN BENDS AND FITTINGS
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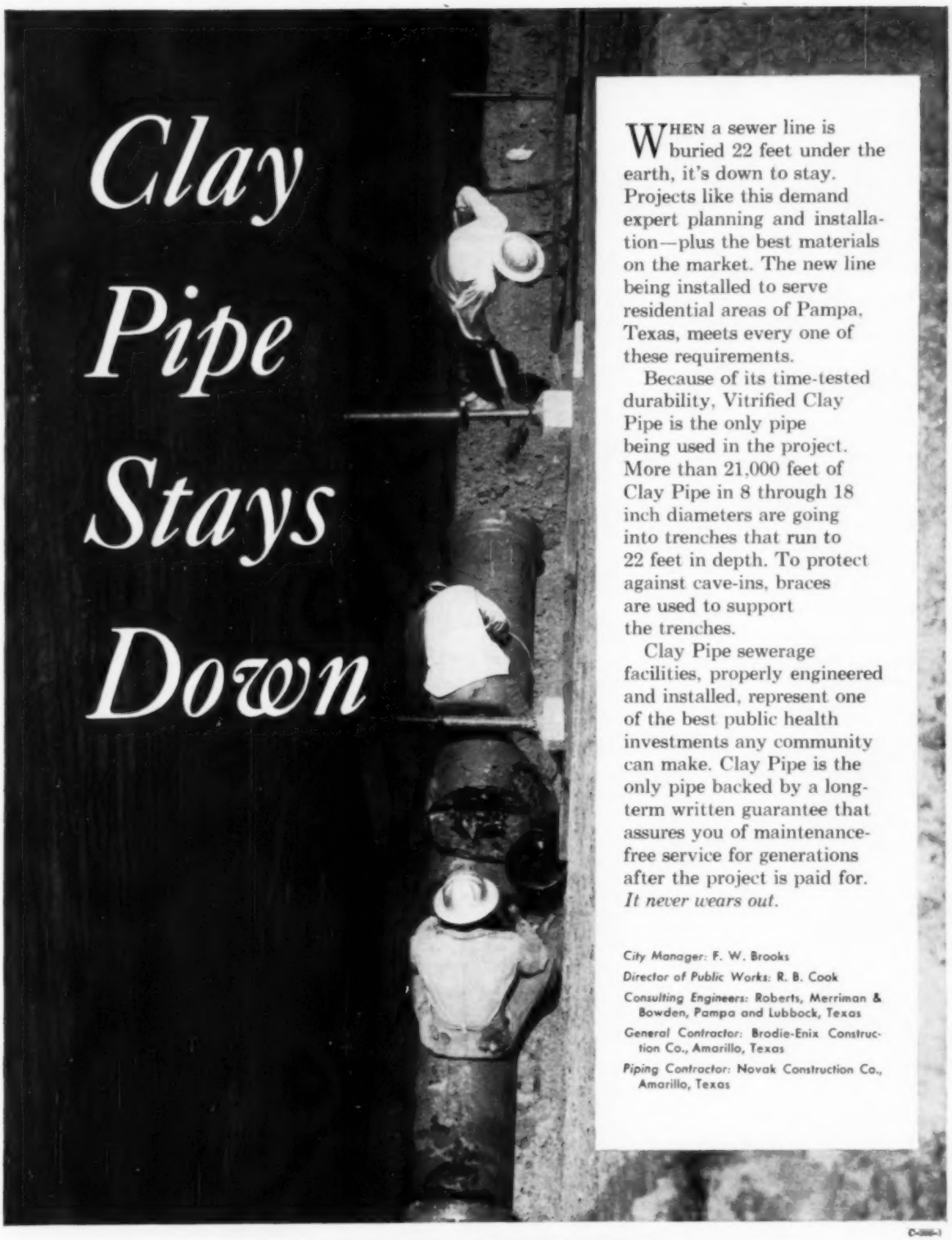


Clay Pipe Stays Down

WHEN a sewer line is buried 22 feet under the earth, it's down to stay. Projects like this demand expert planning and installation—plus the best materials on the market. The new line being installed to serve residential areas of Pampa, Texas, meets every one of these requirements.

Because of its time-tested durability, Vitrified Clay Pipe is the only pipe being used in the project. More than 21,000 feet of Clay Pipe in 8 through 18 inch diameters are going into trenches that run to 22 feet in depth. To protect against cave-ins, braces are used to support the trenches.

Clay Pipe sewerage facilities, properly engineered and installed, represent one of the best public health investments any community can make. Clay Pipe is the only pipe backed by a long-term written guarantee that assures you of maintenance-free service for generations after the project is paid for. *It never wears out.*

City Manager: F. W. Brooks

Director of Public Works: R. B. Cook

Consulting Engineers: Roberts, Merriman & Bowden, Pampa and Lubbock, Texas

General Contractor: Brodie-Enix Construction Co., Amarillo, Texas

Piping Contractor: Novak Construction Co., Amarillo, Texas

C-3555-1

Vitrified **CLAY PIPE** *Never Wears Out*

NATIONAL CLAY PIPE MANUFACTURERS, INC. 1820 N St., N. W. Washington 6, D. C.

311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio • 703 Ninth & Hill Bldg., Los Angeles 15, Calif. • 100 N. La Salle St., Rm. 2100, Chicago 2, Ill. • 206 Mark Bldg., Atlanta, 3, Ga.

HOW TO SELECT WATER-CONDITIONING EQUIPMENT (NO. 4 OF A SERIES)

Filters

Basic filter parts include: the outside container, the bed of filter medium and the distribution and collection systems to provide a uniform flow through all parts of the bed. Flow rates average 2 to 3 gallons per minute per sq. ft. of bed area.

Filter beds are cleaned periodically by reversing the flow and increasing it to about 10 to 20 gpm per sq. ft. (backwashing). This lifts and swirls the sand, loosening the dirt and flushing it to waste.

Rotary surface washers with high-velocity water jets may be used to help break up the layer of dirt on top of the bed.

After backwashing, the first water through the filter (rinse water) also picks up some dirt and is run to waste.

A "multiport valve" replaces 5 individual valves and reduces the number of valve manipulations for cleaning a filter from 10 to 3. It also indicates the cycle in progress and ensures proper sequence. Operation can be made completely automatic with hydraulically- or motor-operated valves controlled by meters, timers and float switches.

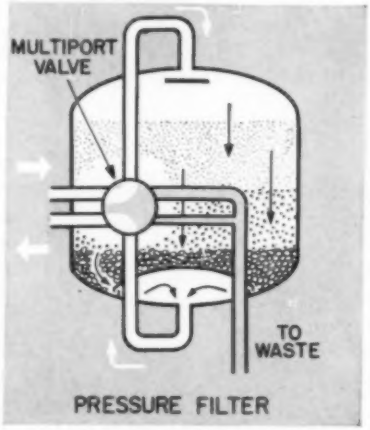
SAND FILTERS for removing dirt, precipitates, suspended solids

Sand filters simply "strain" the water as it flows downward through the filter bed. It is probably the oldest and most widely used method of water treatment.

Gravity filters. Practically all large public water-supply plants include a series of gravity filters made of concrete for permanence and low maintenance cost. Sizes run up to 400 or 500 sq. ft. for each filter.

Chief difference among concrete gravity filters is the method of water collection under the filter bed. The false bottom system provides uniform collection but requires about 2 ft. extra filter height and is highest in cost. Header-lateral collection systems of steel pipe are lowest in cost but do not provide perfectly uniform collection and can corrode. There are also patented systems such as Permutit's *Monocrete*® system which uses collapsible forms for casting lateral ducts in the concrete itself. *Monocrete* ducts are oversize for uniform collection and are corrosion-free since no metal is used. The cost is less than for false-bottom construction.

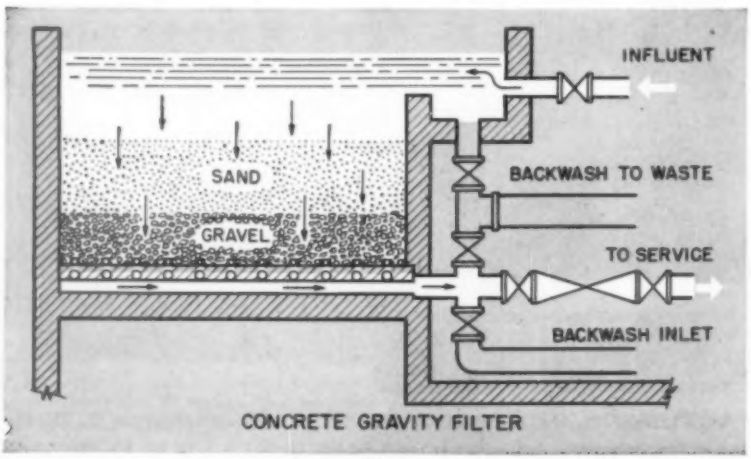
Steel-tank gravity filters cost less than concrete in small and medium sizes and are generally used in industrial plants. Wood-tank filters have low maintenance cost, but they are not practical for large sizes and not as attractive as painted metal. They are now used primarily where there is a metal shortage.



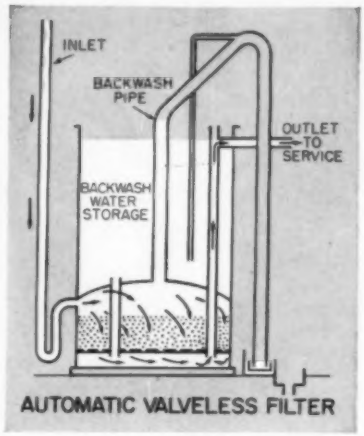
PRESSURE FILTER

Pressure filters deliver an effluent under pressure, usually under 100 psi, to eliminate repumping. Since no water depth is required over the bed to provide pressure, these filters are smaller and lower in cost than gravity filters of the same capacity.

Vertical pressure filters are available to 12 ft. diam. with approx. 113 sq. ft. of bed area. Horizontal pressure filters provide large filter-bed areas, up to 200 sq. ft., at lowest tank cost but may not maintain as uniform bed conditions as vertical type.



CONCRETE GRAVITY FILTER



AUTOMATIC VALVELESS FILTER

Automatic Valveless Filters (gravity type) are a new Permutit development. They greatly reduce filter cost because they use no valves or flow controllers. They provide completely automatic, foolproof self-operation yet actually cost less than conventional manually-operated gravity filters. Sizes up to 12′ diam. available.

When the suspended matter removed by the filter bed causes the pressure loss to reach a predetermined figure, backwashing starts automatically. At end of backwash, flow reverses automatically, and the backwash storage compartment is then filled with a brief rinse plus filtered water. Filtered water then passes to service through a separate outlet.

FILTER MEDIA for removing oil, bad tastes, odors, etc.

Graded anthracite coal. Used in place of sand to minimize pick-up of silica following hot-process softening of boiler feedwater or for removal of oil from steam condensate.

Activated Carbon (Carbo-Dur®). Absorbs excess chlorine and dissolved elements caused by decayed vegetation or algae that affect taste and odor. Carbon filters or "purifiers" are backwashed to remove suspended matter picked up by the filter.

Calcium Carbonate (Neutralite) raises the pH of low-pH, corrosive water at the same time that it filters.

Manganese zeolite oxidizes and removes moderate amounts of iron and manganese, also hydrogen sulphide, chief cause of "rotten egg" odor and sulphur taste. It is regenerated with potassium permanganate.

For information on filters or other water-conditioning equipment, write: The Permutit Company, Dept. W-2, 50 West 44th St., New York 36, N. Y. or Permutit Company of Canada, Ltd., Toronto 1, Ont.

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rhymes with "compute it"
a division of PFAUDLER PERMUTIT INC.
Water Conditioning
Ion Exchange • Industrial Waste Treatment

Vol. 105 No. 2

February · 1958

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WATER & SEWAGE WORKS

SEWAGE WORKS PROGRESS in 1957 *posed questions and challenges as well as producing some answers and accomplishments according to* **K. S. Watson** 45

LIQUID ALUM *as a coagulant, its use, its availability, cost, handling etc., are discussed by* **R. W. Ockershausen** 61

TORQUE CHARACTERISTICS *of butterfly valves, what they are, what they mean*—**by A. E. Hatch and W. H. Chamberlain** 67

SALINE WATER TREATMENT *improvements may have a bearing on future water supply planning*—**by R. H. Sievers** 70

INDUSTRIAL EFFLUENTS *in municipal sewers present problems in Britain according to* **John Finch** 72

CONVEYING FLOWABLE MATERIALS *by advanced techniques is finding application in grit handling says* **Lyne S. Metcalfe** 76

SEWER DESIGN SLIDE RULE by Irving Goldfein 80

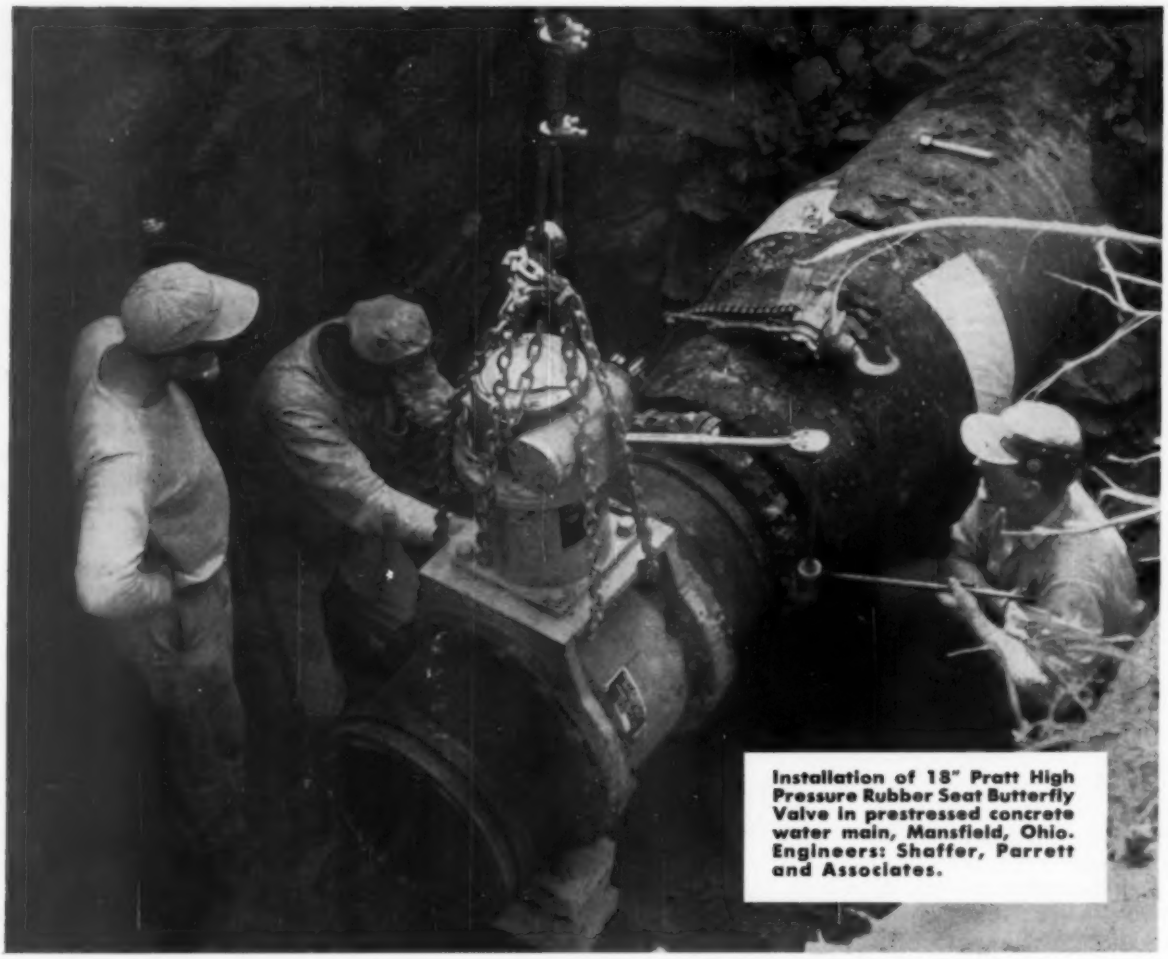
SEWERS AND INFILTRATION *were among the topics discussed at The Pac. N.W. SIWA meeting; reported* **by G. H. Dunston** 81

BLOWER MAINTENANCE, *aeration, sludge digestion were included in the program of the Ind. SIWA; reported by* **D. E. Bloodgood** 83

OUR NEW EDITOR 85

THE EDITOR'S COMMENT 86

News Summary 5A
Equipment News 9A
New Bulletins 25A
Coming Events 94A
News of Suppliers 96A
Helpful Free Literature 106A



Installation of 18" Pratt High Pressure Rubber Seat Butterfly Valve in prestressed concrete water main, Mansfield, Ohio. Engineers: Shaffer, Parrett and Associates.

MANSFIELD . . . Pratt Butterfly Valves meet all specs for distribution service

The real test of a distribution valve is its ability to operate when needed. Valves in water distribution service are primarily emergency measures, normally left either open or closed for months, or even years. Yet, they must operate when needed, often to prevent serious property damage in the event of a broken water main.

Mansfield engineers chose Pratt High Pressure Rubber Seat Butterfly Valves for this rigorous duty because Pratt valves meet all specifications for distribution service. The critical disc edge is a corrosion-resistant material, seating against a heavy, mechanically retained rubber liner to provide *permanent, drop-tight shutoff.* The stainless steel valve shaft rotates in bronze bearings, self-lubricated for life, and the valve operator is permanently lubricated and sealed. These features are your assurance of easy operation when you need it . . . features that are built into Pratt valves with the experience that comes with 30 years of leadership in butterfly valve design. Specifying Pratt valves puts this experience to work for you.

NEW! Latest, most accurate pressure drop and flow data, conversion tables, discussion of butterfly valve theory and application plus other technical information . . . **Manual B-2B.**

HENRY PRATT

RUBBER SEAT Butterfly Valves

Henry Pratt Company, 2222 S. Halsted St., Chicago 8, Ill. Representatives in principal cities

NEWS SUMMARY

The 1957 index is available, now; copies may be obtained by writing our editorial office at 155 E. 44th St., New York 17, N. Y.

Sewage and Industrial Waste Treatment in 1957 posed a number of questions and provided some new answers. Construction grants, lagoons, combined treatment, research, reclamation, certification of engineers and activities of The Federation, all played an important part in the significant trends and challenges of this past year according to FSIWA President—Page 45.

Liquid Alum is not new but its use as a coagulant in water purification plants has grown markedly in the past 20 years. Reasonable distance to the manufacturing plant plays an important part in the cost; it has many advantages over dry alum—Page 67.

Torque Characteristics of butterfly valves and how they are determined are discussed in this second of a two-part article—Page 67.

Saline Water Treatment is improving in methods, and costs are being reduced; these factors may make it desirable to consider this treatment when planning a new supjply—Page 70.

Industrial Effluents in municipal sewers continues to occupy the attention of British engineers, according to the Report From Abroad—Page 72.

Conveying Flowable Materials, particularly the movement of solids in sewage plants, is now being accomplished by the use of tubular conveyors. Grit handling is one of the principal uses of this new technique—Page 76.

Sewers and Infiltration occupied the attention of The Pac. NWS & IWA meeting last fall—Page 81.

Blower Maintenance was one of the principal topics of discussion at the November meeting of the Indiana Sew. & Ind. Wastes Assn., which took the first step toward becoming affiliated directly with The Federation, not as a part of Central States—Page 83.

P.L. 660 Grants for sewage works construction have increased local spending according to PHS figures last year. This fact is relied on by HEW Secretary Folsom to bolster his request for at least $35 million in the next federal budget. Budget Director Brundage is against any funds.

Membrane Filter Procedure has been approved by The AWWA Executive Committee, as an alternate to the completed tests when two conditions are met; namely, if the laboratory administrator is satisfied with its acceptability and if the state sanitary engineering laboratory approves the procedure for public water supplies in its state—Page 71.

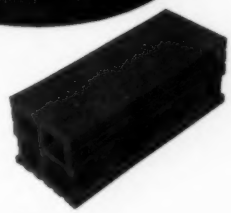
Ohio Valley Report No. 9 shows that 86 percent of the pollution load in the area is now or soon will be receiving treatment.

Precipitation in The United States in mil gal per cap and in mil gal per sq mi (by states) has been tabulated, summarized and mapped by the U. S. Weather Bureau.

A GOOD COMBINATION

for better performance— lower operating costs . . .

LEOPOLD FILTER BOTTOMS



Designed to successfully meet all underdrain requirements

Made of de-aired fire clay—vitrified and salt glazed, the Leopold Filter Bottom is unequalled for dependable, economical service. The individual blocks resist corrosion, are not subject to tuberculation, and will last indefinitely. Too, they require only small sized gravel, do not need special supporting concrete members, and the Leopold design insures uniform wash distribution.

LEOPOLD Rubber Seated BUTTERFLY VALVES

Assure positive drop-tight shut-off easily, efficiently, economically.

In this design, the seat is of resilient Neoprene rubber or pure gum rubber, vulcanized around a steel ring insert, and held in place by a keeper ring. The steel ring, which is "continuous" to eliminate abnormal wearing, increases the firmness of the seat and assures longer service life.

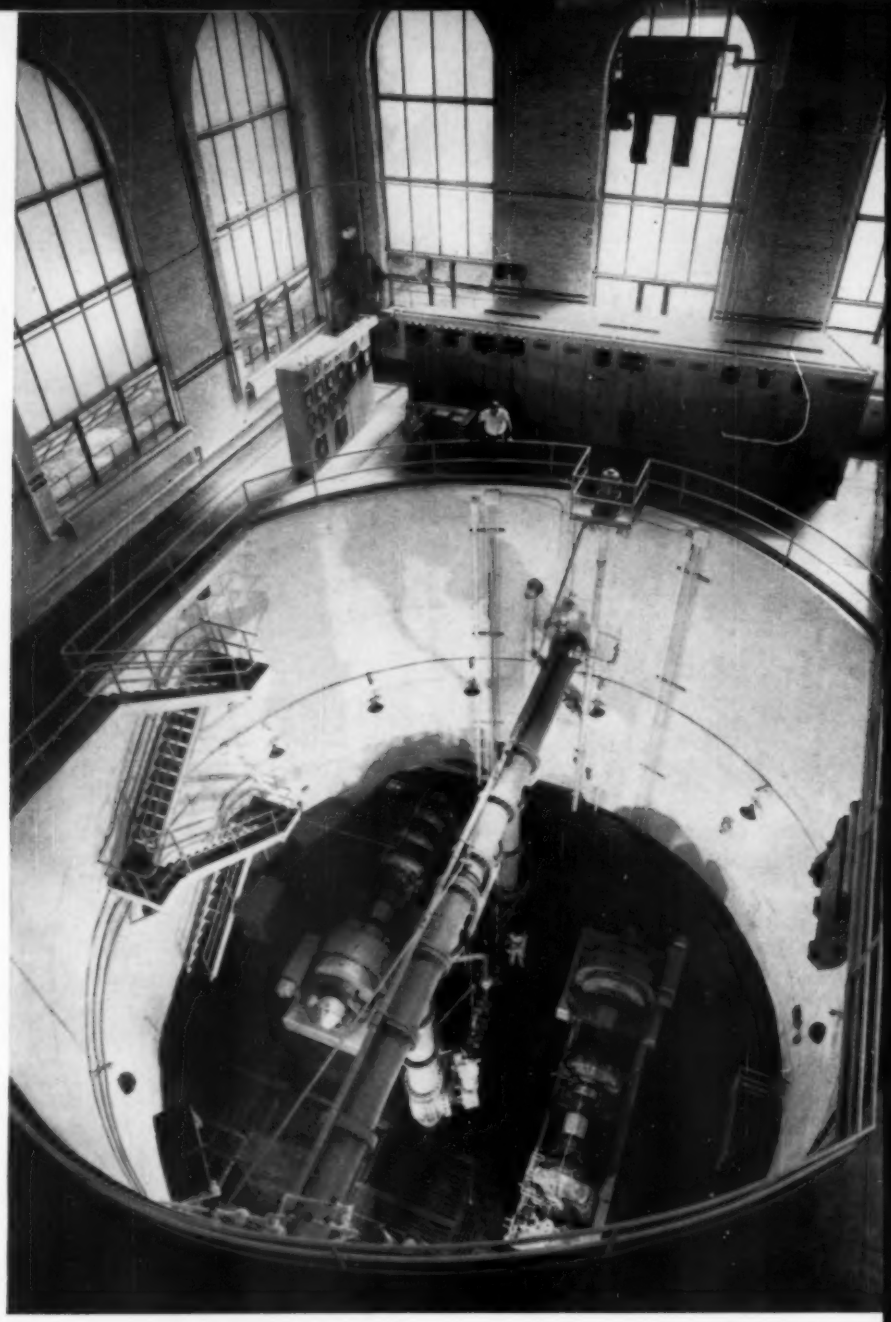
Whether operated manually or by automatic controls, Leopold Butterfly Valves always provide a positive shut-off that's bubble-tight. Made in sizes 6" to 96".

Meet AWWA Specifications C504-55T

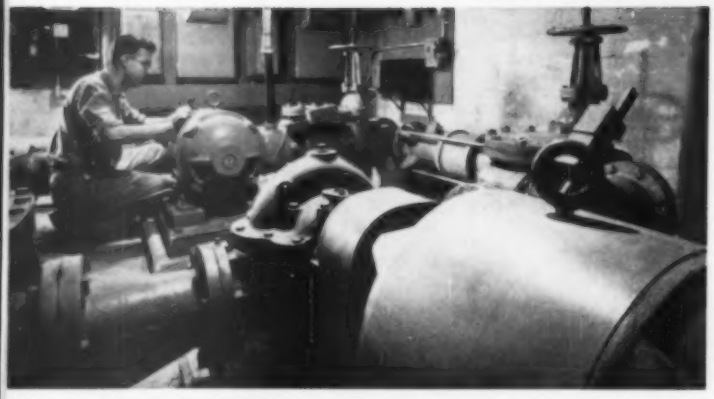
Write today for descriptive literature!

Leopold

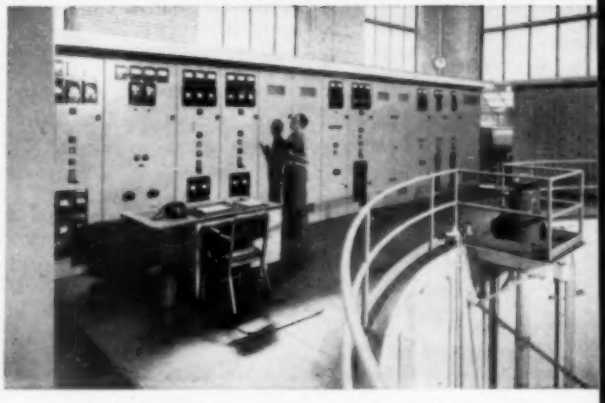
F. B. LEOPOLD CO., INC.
Zelienople, Pa.



View at Nadine Pumping Station shows south pump pit containing pumps No. 2 and No. 3 with Westinghouse metal-clad switchgear and control center for all station pump motors in background.



Close-up view in booster station shows two 40-hp Westinghouse motor-driven booster pumps, Westinghouse safety switches, motor starters and power factor correction capacitor.



Metal-clad switchgear includes: incoming line section; starting breakers for 1000- and 1250-hp synchronous motors and their auxiliary field control cubicles; starting and running breakers and reactors for two 2500-hp motors.

Water pumping station saves $66,500 annually by Powering-Up electrically

The need for extensive modernization and expansion of water pumping facilities at Nadine Pumping Station of The Wilkinsburg-Penn Joint Water Authority brought about a complete change from steam to electric motor-driven pumps. One new 6.5-mgd pump was added to the three already in use to increase total capacity to 52,000,000 gallons per day.

In addition to the benefits of increased capacity and complete station electrification, comparative figures show a reduction in annual operating costs from approximately $268,000 to $201,500, for a savings of $66,500 per year. This represents an annual return of about 19% on the modernization cost of approximately $350,000. This fast five-year amortization of the investment eliminated the necessity of bond issues or other financing.

Besides the four new pump motors supplied by Westinghouse, the station now contains a line-up of 5-kv metal-clad switchgear, a 150-kva dry-type power center transformer, a motor control center for auxiliary power and a station battery and automatic battery charger.

The electrical Powering-Up of this pumping station has also made possible a more flexible discharge piping arrangement and the electric operation of valves and other equipment.

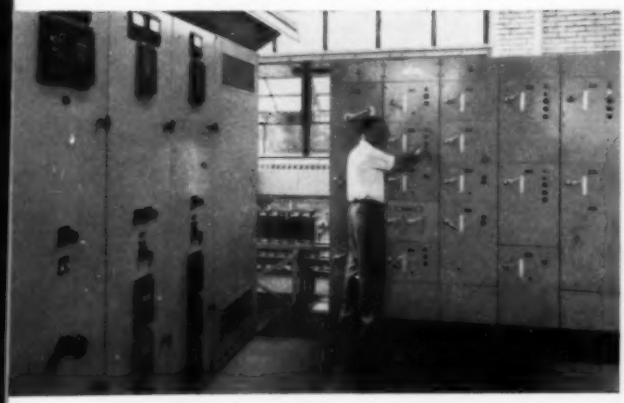
Powering-Up electrically can mean similar important benefits and savings for you. For further information, call the Westinghouse electrical construction engineer nearest you. He can help you in your Power-Up program. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

Owner: The Wilkinsburg-Penn Joint Water Authority
Consulting Engineers: Morris Knowles, Incorporated
General Contractors: Dravo Corporation
Electrical Contractor: Morganstern Electric Co., Incorporated

J-94088

YOU CAN BE SURE...IF IT'S Westinghouse

Over 250 Pages
Westinghouse Data
In Sweet's Construction File.



Shown at left is metal-clad switchgear feeder cubicle and 150-kva dry-type transformer. Motor control center at right contains motor starters and feeder breakers for various station auxiliaries.

Engineering group shown includes: George A. Maibach, Chief Engineer, Nadine Pumping Station; G. V. Gustafson, Morris Knowles, Inc., Consulting Engineers; M. B. Trimble, Westinghouse Construction Sales Engineer.

WATERSPHEROIDS®

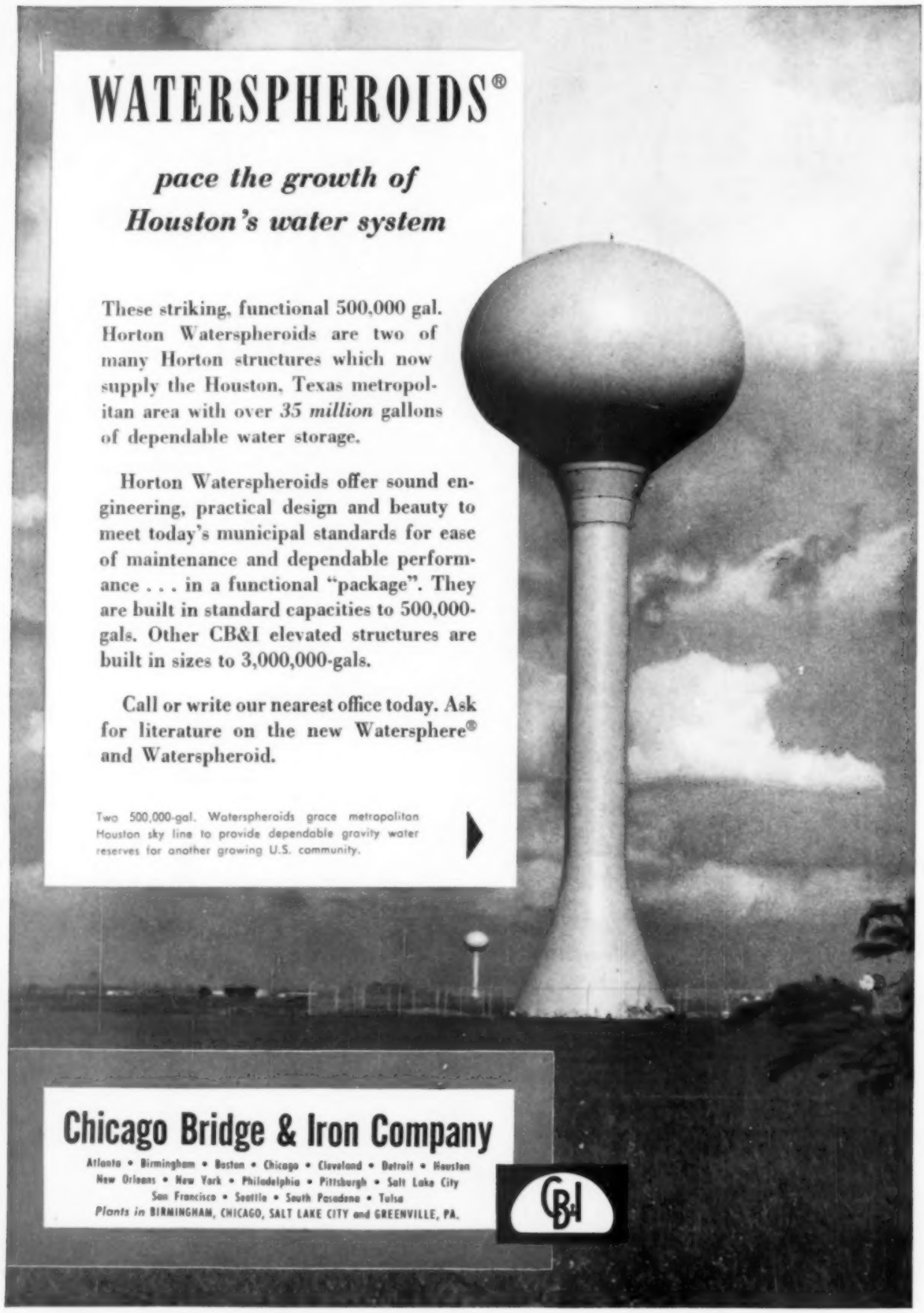
pace the growth of Houston's water system

These striking, functional 500,000 gal. Horton Waterspheroids are two of many Horton structures which now supply the Houston, Texas metropolitan area with over *35 million* gallons of dependable water storage.

Horton Waterspheroids offer sound engineering, practical design and beauty to meet today's municipal standards for ease of maintenance and dependable performance . . . in a functional "package". They are built in standard capacities to 500,000-gals. Other CB&I elevated structures are built in sizes to 3,000,000-gals.

Call or write our nearest office today. Ask for literature on the new Watersphere® and Waterspheroid.

Two 500,000-gal. Waterspheroids grace metropolitan Houston sky line to provide dependable gravity water reserves for another growing U.S. community.



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Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

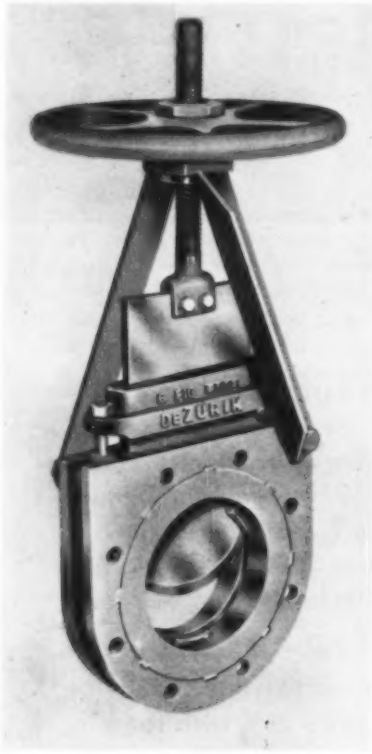
CBI

Equipment News

Bonnetless Gate Valve

201

The DeZurik Corporation, Sartell, Minnesota, has announced a new fabricated bonnetless gate valve, designed for handling fibrous, viscous and slurry type flows.



The new valve has a round port bottom, eliminating square "corner cavities" or pockets where solid material can pack and interfere with full descent of the gate, preventing shut off. The lower end of the gate is sharpened to shear its way through fibers or other solid material in the flow. The upper end is full width and extends through the packing gland, completely eliminating the bonnet cavity usually found on gate valves. The gate is made of heavy plate to prevent distortion and buckling under line pressure.

The usual construction consists of carbon steel flanges with a stainless steel facing ring on each flange extending out to the bolt circle. Heavy ribs join the flanges into one solid unit which will not distort and bind the gate when subjected to piping strains. The body chest, seat ring, gate and all other wetted parts are of stainless steel. With this type of construction the valve offers excellent corrosion resistance, yet is economically priced.

Package Waste Treatment Unit

202

Dorr-Oliver, Inc., Stamford, Conn., has the availability of the Dorr-Oliver CompleTreator, a self-contained unit providing complete waste treatment facilities for small plants. Utilizing a standard two-stage Biofiltration flowsheet, this newly developed package plant will handle wastes of 150 persons or their equivalent in solids and B.O.D. It is particularly applicable to treatment of wastes from small housing developments, restaurants, service stations, military installations and schools.

The Dorr-Oliver CompleTreator is a completely assembled unit contained in an 11′ 9″ high steel tank. It comprises a Dorr Duo-Clarigester annularly surrounded by two stages of high-rate trickling filters and equipped with two recirculation pumps and required electrical equipment.

Magnetic Propeller Drive Main-Line Meter

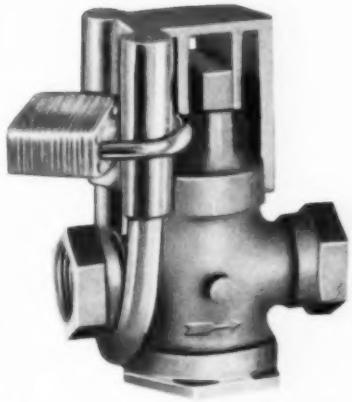
203

Sparling Meter Co., El Monte, Calif., has developed a new main-line meter, incorporating a powerful radial magnet, molded as an integral part of the propeller hub. A companion mag-

net on the drive shaft of the meter permits motion to be transmitted to a sealed transmission from the propeller to the register. This sealed mecha-

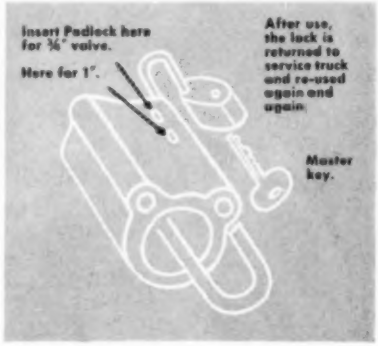
CONTINUED ON PAGE 11A

New Bremer Curb Lock
controls water cut-offs



Bremer Curb Lock Will Not Fit, unless water has been turned off," as shown above.

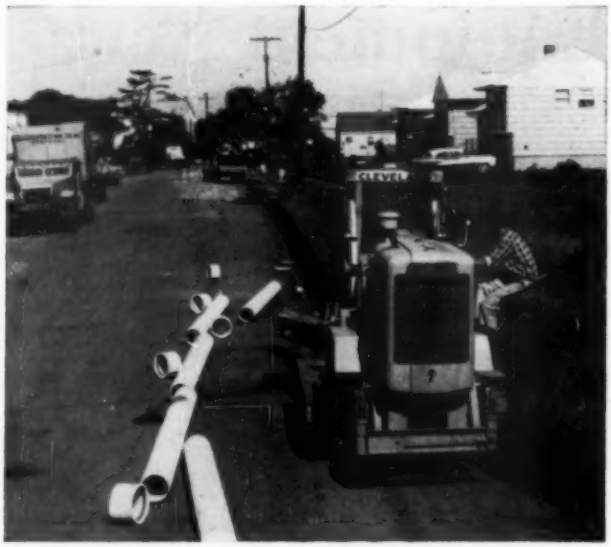
$3.95* ea.
F.O.B. Jacksonville, Fla.


Insert Padlock here for ¾" valve.
Here for 1".
After use, the lock is returned to service truck and re-used again and again.
Master key.

- **One trip installation**
- **Foolproof locking device**
- **Does not wear**
- **Will not corrode**
- **Prevents loss of revenue**
- **No need to remove meter**
- **Lifetime unit**
- **Made of cast aluminum**
- **Controls sub-division problem**
- **Controls vacant house problem**
- **Used where and when needed**

BREMER BREASE, INC.
1107 MARGARET STREET
JACKSONVILLE, FLORIDA

Trench digging with Cleveland cuts repaving costs 25%



ERN CONSTRUCTION CO's new Cleveland 110 Trencher cut repaving costs 25% on the installation of 11,000 feet of 12 and 8 inch pipe throughout East Brunswick Township near Springfield, New Jersey. Trench was 5½ feet deep and 24 inches wide. Foreman Henry Appleby says:

> **"We're able to reduce repaving costs 25% with the Cleveland because it cuts cleaner, narrower trench than the backhoe method we used previously."**

"We get better production, too," says Appleby. "The Cleveland digs about 780 feet of trench per hour compared to about 100 to 150 feet with the backhoe."

Good Everywhere

The CLEVELAND TRENCHER Co.

20100 St. Clair Avenue • Cleveland 17, Ohio

Equipment News

CONTINUED FROM PAGE 9A

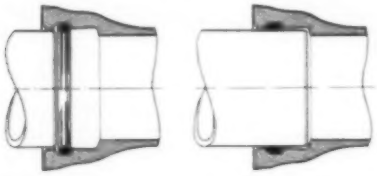
nism reduces friction and maintenance. This new direct mounted indicator-totalizer is a standard feature of the Sparling Masterflo meter. Available in 4" to 24" sizes. Working pressures, either Standard 150 or 250 psi.

Altite Joint Pipe

204

Alabama Pipe Co., Anniston, Ala., has developed the Altite joint. The new joint is an inexpensive, simple and easily assembled joint that retains all the features of conventional joints.

The joint consists of only one accessory, a rubber gasket. The inside contour of the Bell provides a seat for



holding the gasket and the plain end of the pipe is furnished with a slight taper to ease its sliding into the gasket.

The gasket consists of a soft rubber O-ring with hard rubber tips made integrally on opposite sides of the O-ring. The symmerical shape allows the gasket to be placed in the gasket seat without any concern about the gasket being installed backwards. Composition and dimensions of the gasket have been carefully determined to assure a tight and lasting seal.

Chemical Feeder Has a Self-Cleaning Mechanism

205

Wallace & Tiernan, Inc., Belleville, N. J., has developed a new Dry Chemical Feeder with a self-cleaning feeding mechanism. The unit will feed up to a rate of 2.85 cubic feet per hour.

The self-cleaning feed screw discharges the chemical alternately from each end of a feed tube. While one end of the screw is discharging the chemical, the other end is cleaned by being threaded through the material.

CONTINUED ON PAGE 13A

Engineering PLUS...

Keeps Tank Interiors Corrosion Free at a Practical Cost

One of the five municipal tanks serving the City of Jacksonville, Fla. which has been cathodically protected by E.R.P. system since 1942.

The City of Jacksonville, Fla. has relied on engineering plus from Electro Rust-Proofing Corp. since 1942 to protect water storage tanks serving the city. Since installation of cathodic protection, tanks have been virtually corrosion free on the under water surfaces and maintenance costs have been reduced to a minimum.

E.R.P. engineering plus means cathodic protection systems
designed to meet your needs...
maintained to your benefit...
priced to your profit...

E.R.P. provides engineering plus to meet any corrosion problem of submerged or buried metals. For full information on cathodic protection for your water storage tanks, water treatment structures and pipelines, write for bulletin E-42.

E·R·P CATHODIC PROTECTION SINCE 1935

ELECTRO RUST-PROOFING CORP.
A SUBSIDIARY OF WALLACE & TIERNAN INC.
30 MAIN STREET, BELLEVILLE 9, NEW JERSEY
CABLE: ELECTRO, NEWARK, N. J.

HOW TO DETECT 3 PARTS CHLORINE IN A MILLION PARTS AIR

New W&T Solvay Chlorine Detector*
detects as little as 3 p.p.m. chlorine in a continuous air-stream sample. Automatically sets off alarm at higher concentrations.

Write for Publication 50.118

WALLACE & TIERNAN
INCORPORATED
25 MAIN ST., BELLEVILLE 9, N. J.

I-55 *Manufactured under patent license from Solvay Process Div., Allied Chemical & Dye Corp.

FEEDING LIME?

...It's Omega Time!

FOR FEEDING AND SLAKING QUICKLIME IN LARGE PLANTS

Omega Lime Slaker with Loss-In-Weight Feeder

Accuracy — within ±1% of set feed rate (by weight)

Capacity — 50 to 12,000 lbs./hr.

Feed range — up to 100 to 1 on feeder . . . 10 to 1 on slaker

FOR FEEDING LIME SLURRY IN LARGE PLANTS

Omega Rotodip Liquid Feeder

Accuracy — within ±1% of calibrated rate

Capacity — maximum rates up to 1800 gph

Feed range — up to 100 to 1

FOR FEEDING HYDRATED LIME . . .

Omega Loss-In-Weight Feeder, Model 30

Accuracy — within ±1% (by weight) of set feed rate

Capacity — up to 2000 lbs./hr.

Feed range — as high as 100 to 1 if necessary

Omega Universal Feeder

Accuracy — within ±3% to 5% by weight

Capacity — 3 sizes for feed rates up to 5000 lbs./hr.

Feed range — up to 40 to 1 for any specific application

Omega Model 50A Disc Feeder

Accuracy — within ±3% to 5% by weight

Capacity — from 20 to 1700 cu. in./hr.

Feed range — up to 10 to 1 . . . any one of three change gears.

If you're feeding lime . . . quicklime, hydrated lime or dolomite, as a slurry or dry, at low or high rates . . . and want to do it economically, accurately, and dependably . . . investigate the advantages of Omega Feeders. For specific recommendations, send complete details of your feeding requirements . . . to

Omega Machine Co., 350 Harris Avenue, Providence 1, R. I.

OMEGA MACHINE CO.
DIVISION OF
B-I-F INDUSTRIES
BIF METERS FEEDERS CONTROLS

Equipment News

CONTINUED FROM PAGE 11A

This feeding mechanism of the A-690 feeder is also designed to prevent chemical flooding. The feed rate is adjustable over a wide range by simply turning a knob connected to a feed register.

The A-690 Feeder has a hopper capacity of 3¼ cubic feet. Arching in the hopper is prevented by the action of oscillating diaphragm-type agitators.

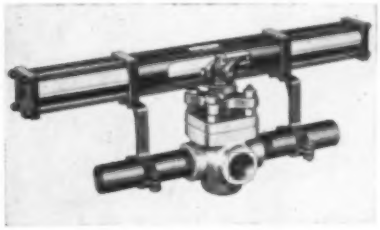
The feeder is dust-proof and is constructed of heavy gauge steel with a corrosion resistant finish. Two solution chambers are available; a twin jet agitated swirl type chamber and a 25 gallon tank with a triple jet mixer or mechanical mixer.

Medium Duty Plug Valve Operator

206

Ledeen Mfg. Co., El Monte, Calif., has introduced a new line of medium duty plug valve operators for use at pressure up to 200 psi.

These valve operators are adaptable to a wide range of control requirements, including process cycling, safety and automatic shut-offs, or any combination of these requirements.



The new line of operators offers a torque range up to 94,000 in-lbs. A new dual pipe mounting bracket is available for two of the models for easy field installation. Bonnet and flange type valve mounting brackets are also available. A wide variety of control valves can be supplied for automatic or remote operation of these valve operators.

Hydraulic Backhoe Attaches In 30 Seconds

207

Snap-On-Digger Company, Winona, Minn., has developed a new hydraulic backhoe with exclusive features of quick attachment and detachment.

Called the Snap-On-Digger and engineered to fit standard make tractors, the all hydraulic unit attaches or detaches in thirty seconds.

One conveniently located release lever and a single break-away coupled hose are the only manipulation required to detach, leaving the unit standing on a tripod of the backhoe and the two hydraulic stabilizers. This frees the tractor for other equipment. Attachment is just as simple. The manufacturer claims that the movement of a single lever and the recoupling of the hydraulic hose can also be done in less than half-a minute.

The unit has more than twelve feet of digging depth, practically nine foot loading clearance and a continuous swing of 190° by means of an easily controlled heavy-duty hydraulic system.

The Snap-On-Digger Company also manufactures a front-end loader called the Model 82 Snappy Loader. Heavy-duty hydraulic cylinders, a sixty inch width bucket and an eight and a half foot dumping clearance are principal features.

Direct Graphic Records Of Liquid Flow

208

Leupold & Stevens Instruments, Inc., Portland, Ore., has developed a new type of chart which gives direct graphic records of liquid flow, for use with their Stevens Type F Water Level Recorder. This instrument with the new direct-reading flow chart is used for measuring sewage, industrial waste, irrigation water and other flows through Parshall flumes.

Heretofore, only direct readings of surface fluctuations have been recorded by Standard Stevens Water Level Recorders, and from this data the actual flow is computed. The new chart for the Stevens Type F Recorder is graduated to give direct readings of flow in million gallons per day or gallons per minute over various sizes of Parshall flumes.

No mathematical conversion of surface level units into flow units is required when the Recorder and new chart are used in conjunction with Parshall flumes of standard sizes. The same recorder can also be used with charts reading in feet and hundredths to record head or surface fluctuations in lakes, streams and wells.

CONTINUED ON PAGE 19A

MECHANICAL EQUIPMENT BY ROBERTS FILTER MFG. CO. DARBY, PENNA.

Synonym for...

PURE WATER

ROBERTS FILTER
MANUFACTURING CO.
607 COLUMBIA AVE.
DARBY, PA.

HEAVY-DUTY
ELLIS PIPE CUTTER
FOR CUTTING LARGE SIZE PIPE

Drop-Forged Frame and Links

Long-Lasting Cutter Wheels

Makes a Hit With Water Works Men

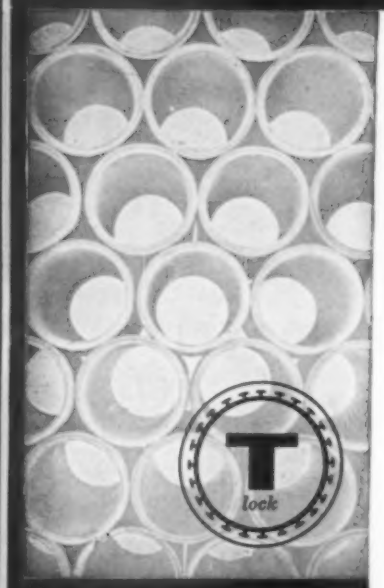
Cuts Pipe in or Out of Ditch

TWO SIZES

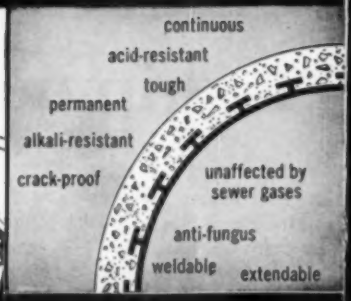
No. 01 for 4" to 8" Pipe
No. 1 for 4" to 12" Pipe

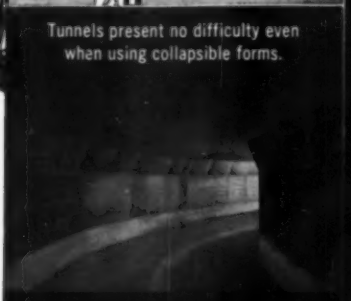
Write for Circular and Price List No. 40WS

ELLIS & FORD MFG. CO.
FERNDALE 20, MICH.



T-lock® sewer lining prevents hydrogen sulfide attack...





Tunnels present no difficulty even when using collapsible forms.

MILLIONS OF SQUARE FEET NOW IN USE! T-Lock Amer-Plate permanently ends corrosion in concrete sewer systems—because it is impervious to hydrogen sulfide, other sewer gases, fungus, bacteria, acids, alkalies and salts.

T-Lock is an extremely dense, flexible, crack-proof liner of high polymer vinyl resin. Integral T-shaped ribs are permanently locked into concrete during pouring. Joints are heat-fused to form a continuous protective lining that will not separate from the concrete even under extreme back pressure.

Over 3 million square feet of T-Lock Amer-Plate have been installed in pre-cast, cast-in-place and monolithic sewer structures of all sizes with no sacrifice of structural strength — at costs comparable to earlier lining methods.

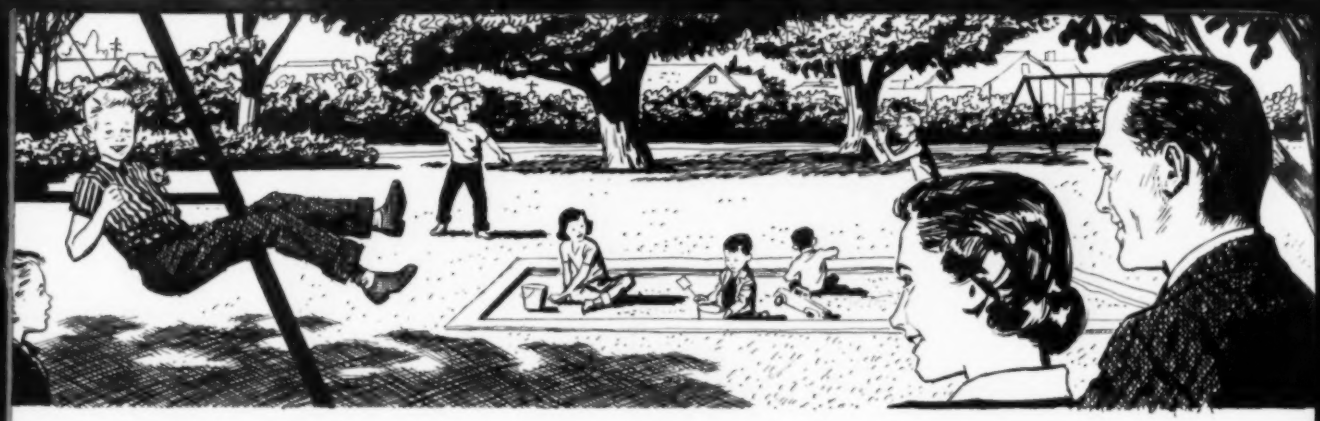
Illustrated brochure and list of typical installations on request.

Houston, Tex.
Jacksonville, Fla.
Kenilworth, N.J.
Evanston, Ill

Amercoat® CORPORATION, Dept. WE
4809 Firestone Blvd., South Gate, Calif.

Readily adaptable to complex forms for cast-in-place structures.

T-Lock in place on inner form before pipe is poured.



Playgrounds assured...

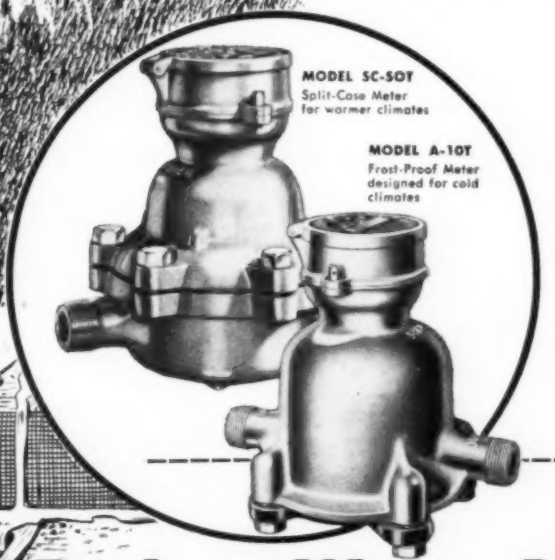
but what about their most precious possession...water?

Protect your community's water and future...with Badger Meters

Recreation facilities are an asset to your community. That's why you willingly allocate funds for their expansion. But what about water supplies? They're *vital* to community existence. Yet many communities are retarded in their growth because there just isn't enough water for expansion.

You can start conserving water and insure your community's future *now*. With Badger Meters, every consumer is assessed fairly for water used or wasted. This fair-share, fair-pay plan stops water waste . . . assures future supplies for community growth. And when water waste stops . . . conservation begins.

Precision-engineered from the finest alloys for lasting, dependable efficiency, Badger Meters put your water system on a profitable business basis. Whether your system requires disc, turbine or compound meters—you can choose the right type from the complete Badger Meter line—in sizes from ⅝ in. through 12 in. Ask your Badger Meter representative for facts — or write for literature *today*.



Badger Water Meters

Water is vital

Badger Meters have conserved it better for over 50 years

BADGER METER MFG. CO. • 2371 North 30th Street
Milwaukee 45, Wisconsin • OFFICES IN PRINCIPAL CITIES

of the many sewage treatment plants where DeZurik Valves are on the job!

The list of sewage treatment plants using DeZurik Valves grows each day!

Those listed at the right are a few of the more recent examples.

The reason for selecting DeZurik Valves may vary . . . but the results are the same! Dead-tight shut-off every time . . . on any line! Easy operation . . . without lubrication! Longer life at lower cost with minimum maintenance.

In addition to these advantages, DeZurik Valves give you nickel seats as standard trim. And because of their "single-faced" plug, liquids are not "trapped" in the plug to freeze or ferment.

Want more details on DeZurik Valves? Representatives are in all principal cities, or write to

FT. LAUDERDALE, FLA.
Consulting Engineers
Philpott, Ross & Saarinen
70 DeZurik Valves from 1½" thru 16"

LOS ALTOS, CALIFORNIA
Consulting Engineers
Brown & Caldwell
72 DeZurik Valves from ¾" thru 6"

MARE ISLAND, CALIFORNIA
Consulting Engineers
Quinton Engineering, Ltd.
70 DeZurik Valves 1" thru 10"

ALBUQUERQUE, N. M.
Consulting Engineers
W. F. Turney & Associates
59 DeZurik Valves 4" thru 10"

VALLEJO, CALIFORNIA
Consulting Engineers
Brown & Caldwell
333 DeZurik Valves ¾" thru 8"

CENTRAL CONTRA COSTA, CALIFORNIA
Consulting Engineers
Brown & Caldwell
68 DeZurik Valves ¾" thru 8"

GRAND RAPIDS, MICHIGAN
Consulting Engineers
McNamee, Porter & Seeley
45 DeZurik Valves 4" thru 10"

UKIAH, CALIFORNIA
Consulting Engineers
Brown & Caldwell
74 DeZurik Valves 2" thru 6"

HOPKINSVILLE, KENTUCKY
Consulting Engineers
Howard K. Bell & Associates
98 DeZurik Valves 1½" thru 18"

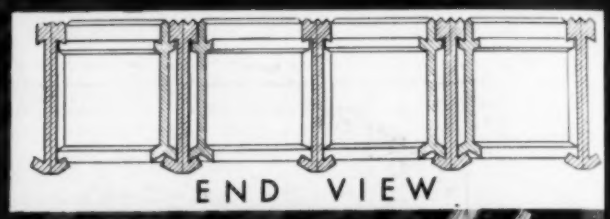
SUPERIOR, WISCONSIN
Consulting Engineers
Hitchcock & Estabrook
88 DeZurik Valves 2" thru 8"

PASSAIC VALLEY, N. J.
Consulting Engineers
Bogart & Childs
48 DeZurik Valves 8" thru 20"

WARREN, MICHIGAN
Consulting Engineers
Johnson & Anderson
106 DeZurik Valves ½" thru 14"

DeZURIK CORPORATION
SARTELL, MINNESOTA

Milwaukee 45, Wisconsin • OFFICES IN PRINCIPAL CITIES



END VIEW

THE FORGES OF KERRIGAN

Roll-Lock

AVAILABLE IN A RANGE OF SUN-FAST ARCHITECTURAL COLORS

Kerrigan's New Concept in Multi-Purpose Aluminum Grating Brings You NEW ECONOMY in Non-sparking, Non-rust, Corrosion-resistant Grating

ECONOMICAL ALUMINUM GRATING with crimped bars permanently ROLL-LOCKED into bearing bars to form a solid one-piece, rattle-proof unit is Kerrigan's latest contribution to open metal flooring design.

Non-rust, corrosion-resistant features make it highly desirable for installations where chemical conditions prevail —sewage plants in particular—and the non-sparking quality eliminates fire hazard. Where slippery conditions indicate extra precautions, Serrated ROLL-LOCK is available to provide additional safety. At the same time, the grating panels are reversible and can be used smooth-side-up to form "slide-paths" for movement of boxes, bags, and packages.

ROLL-LOCK is also handsome and decorative for wall panels, column facings, sunshades, spandrels, and grills. To blend with the new look in buildings it is available in beautiful anodized sun-fast architectural colors and architectural bronze.

← TEAR OUT AND FILE. VALUABLE CATALOG INFORMATION ON OTHER SIDE. WRITE FOR DESK SAMPLE W.

Weldforged GRATING DIVISION

KERRIGAN IRON WORKS, Inc.

Nashville, Tennessee

GENERAL SALES OFFICE - 274 MADISON AVENUE, NEW YORK, N. Y.

KERRIGAN SAFE LOAD TABLE FOR ROLL-LOCK ALUMINUM GRATING

Size of B. Bars	Type	Approx. Wgt. Lbs. per Sq. ft.		DEFLECTION EQUAL TO 1/160 OF SPAN IS NOTED IN PARENTHESIS.																							
				(.150) 2'-0"		(.188) 2'-6"		(.225) 3'-0"		(.263) 3'-6"		(.30) 4'-0"		(.338) 4'-6"		(.375) 5' 0"		(.413) 5'-6"		(.45) 6'-0"		(.488) 6'-6"		(.525) 7'-0"		(.60) 8'-0"		(.675) 9'-0"	
1"	Roll Lock 1"	2.725	U	633		405		236	281	149	207	99	158	70	125	51	101	38	83		70		60		51		39		
			D	119		187		225	268	263	366	30	477	338	604	375	746	413	903		1.074		1.261		1.461		1.909		
			C	633		507			422	326	362	249	317	197	281	159	253	131	230	110	211	94	195	81	181	62	158	49	141
			D	095		149			215	263	292	30	382	338	479	375	597	413	722	45	859	488	1.008	525	1.169	60	1.527	675	1.933
1¼"	Roll Lock 1¼"	3.204	U	931		596		414		274	304	183	233	129	184	94	149	70	123	54	103	43	88		76		58		46
			D	095		149		214		263	292	30	381	338	482	375	595	413	720	45	857	488	1.006		1.166		1.523		1.928
			C	931		745		621			532	458	465	362	414	293	372	242	338	203	310	173	286	149	266	114	234	90	207
			D	076		119		171			233	30	305	338	386	375	476	413	576	45	686	488	805	525	933	60	1.219	675	1.543
1½"	Roll Lock 1½"	3.693	U	1276		817		567		417		301	319	212	252	154	204	116	168	89	142	70	121	56	104	37	79		63
			D	079		123		177		242		30	315	338	399	375	493	413	596	45	709	488	833	525	965		1.261		1.596
			C	1276		1021		851		729		638		567	482	510	399	484	334	425	285	392	246	364	188	319	148	283
			D	063		099		143		195		254		322	375	397	413	480	45	572	488	671	525	778	60	1.016	675	1.286
1¾"	Roll Lock 1¾"	4.91	U	1957		1253		870		639		489	384	386	279	313	210	258	161	217	127	185	102	160	68	122	48	96
			D	067		105		151		206		269	338	340	375	420	413	508	45	605	488	710	525	823	60	1.075	675	1.360
			C	1957		1566		1305		1118		979		870		783		712	607	652	517	602	446	539	341	489	269	435
			D	054		084		121		165		215		272		336		406	45	484	488	568	525	658	60	860	675	1.088
2"	Roll Lock 2"	6.28	U	2984		1910		1326		974		746		589		477	359	394	276	331	217	282	174	243	116	186	82	147
			D	060		094		135		184		240		304		375	413	454	45	54	488	634	525	735	60	96	675	1.215
			C	2984		2387		1989		1705		1492		1326		1194		1085		995	884	918	761	852	583	746	460	663
			D	048		075		108		147		192		243		30		363		432	488	507	525	588	60	768	675	972

Aluminum type 6063T6 used for bearing bars—type 6063T5 for crimped bars.

Using Aluminum type 6061T6 for bearing bars, add approximately 20% to above table . . . (slightly higher in price)

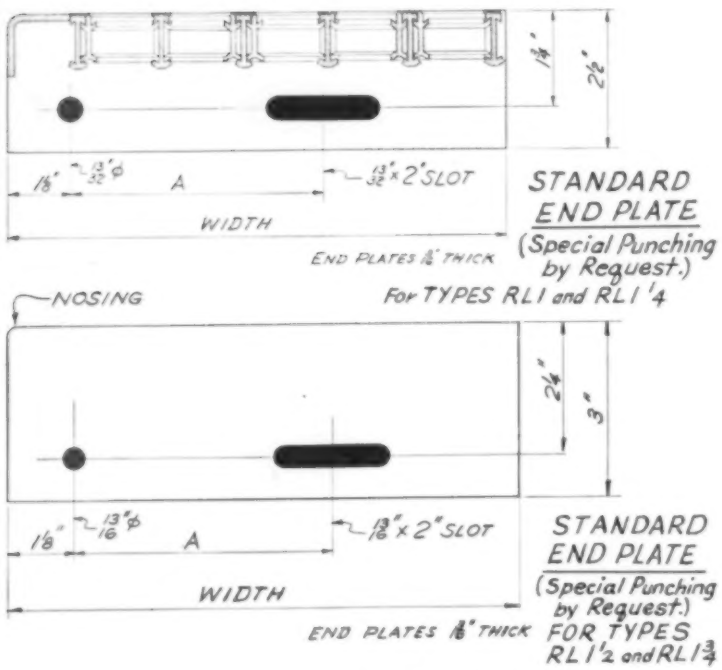
KEY FOR LOAD TABLE

U—Uniform load capacity in pounds per square foot. C—Concentrated load capacity in pounds per foot of width. D—Deflection in inches. All loads based on 10000 psi allowable stress. All deflections based on 10000000 psi Modulus of Elasticity. All loads are theoretical, wgt. of grating not deducted. Loads shown with yellow background will cause deflection in excess of 1/160 of span.

FRACTIONAL WIDTH PANELS FURNISHED TO FILL OUT OVERALL AREAS

25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	.2
35⅞	34⅝	32⅞	31 7/16	30	28½	27	25 9/16	24	22 9/16	21⅛	19⅝	18 3/16	16 1/16	15⅛	13¾	12¼	10 13/16	9 5/16	7⅞	6⅜	4 1/16	3 3/16	2

STAIR TREADS

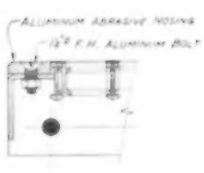


STANDARD END PLATE (Special Punching by Request.) For TYPES RL1 and RL1¼

END PLATES ⅛" THICK

STANDARD END PLATE (Special Punching by Request.) FOR TYPES RL1½ and RL1¾

END PLATES ⅛" THICK



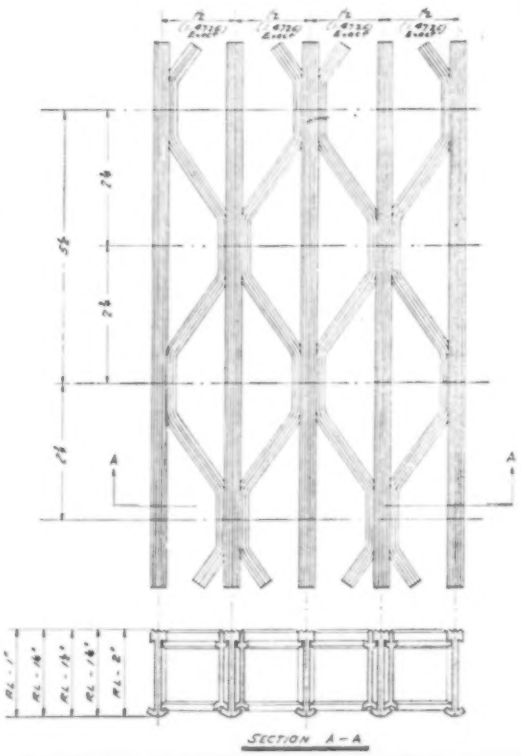
DETAIL OF ABRASIVE NOSING

TABLE OF TREAD WIDTHS

WIDTH	DIM. A
5 5/16	2½
7⅜	4½
8⅜	4½
10⅜	7
11 5/16	7
13⅜	7

ALUMINUM GRATING

ROLL-LOCK TYPE



SECTION A-A

KERRIGAN IRON WORKS, Inc.

Nashville, Tennessee

GENERAL SALES OFFICE - 274 MADISON, N.Y.C.

Weldforged GRATING DIVISION OF . . .

Equipment News

CONTINUED FROM PAGE 13A

Valve with Locking Device

209

Techno Corp., Erie, Pa., has announced that a recent modification of the Technocheck Valve, a patented silent, seatless check valve, provides a device for locking the valve in the closed position.

The new feature affords protection where sticking of the valve in the open position may cause disruption of processes or service.

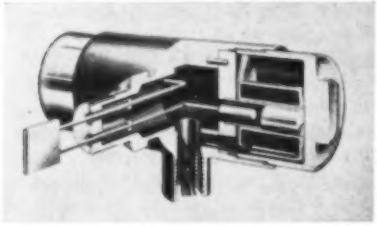
The device is arranged so as to have no fixed connection with the valve. Locking is accomplished by a cam mechanism which rotates against valve members to hold them closed.

The mechanism can be activated manually by a hand wheel or mechanically by means of a solenoid valve, cylinder or similar control.

Level Control For Liquids, Solids and Slurries

210

Automation Products, Inc., Houston, Texas, has developed the "Dynatrol" for the detection of liquid, solid and slurry levels.



The "Dynatrol" utilizes a new design principle for extremely accurate and versatile high or low point detection or narrow range proportional control of liquid, solid and slurry levels. This control has a positive acting electrical output control signal that varies with the amount of immersion of the 120 CPS vibrating paddle in the medium being detected. The output signal can be used to control the operation of any type of electrical equipment. The design allows sensitive transmission of vibrational energy from the drive end to the sensing paddle and back to the output signal end through a linkage path welded to rigid metal pressure seals at the node points where zero amplitude of vibration occurs.

Residual Chlorine Analyzer

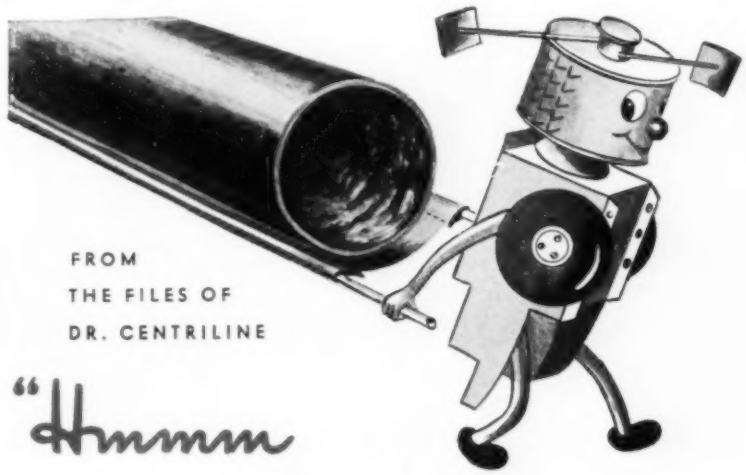
211

Fischer & Porter Company, Hatboro, Pa., has developed a residual chlorine analyzer that provides continuous automatic measurement of free, combined, or total residual chlorine in water or sewage.

Accurate within plus or minus 1% of the maximum range, the analyzer is essentially a double light beam filter photometer. Use of a split beam eliminates any effect that color or turbidity of the chlorinated sample might have. The device is supplied in two standard ranges: 0 to 1 parts per million, or 0 to 10 parts per million. Other intermediate ranges are also available.

Used in combination with a Fischer & Porter recorder, the analyzer can also be used with an electric, electronic, or pneumatic controller or transmitter for automatic control or for remote recording.

CONTINUED ON PAGE 21A



FROM
THE FILES OF
DR. CENTRILINE

"Hmmm ... a bad case of corrosion"

CASE #7841

PATIENT:	8 Miles of 16" and 12" Cast Iron Water Supply Lines in Abington-Rockland (Mass.) Water District.
SYMPTOMS:	Lack of water and pressure during periods of high demand requiring restrictions in the summertime.
DIAGNOSIS:	Poor circulation due to regrowth of tuberculation after cleaning. Available water could not be delivered to consumers.
TREATMENT:	The lines were cleaned and cement lined in place without interrupting service to consumers. In less than 8 weeks the entire job was completed.
RESULTS:	Patient now sound and healthy; pipe capacity permanently doubled, no further summer restrictions, future maintenance costs were eliminated.

If your lines also show signs of suffering from corrosion, leakage or tuberculation, investigate the Centriline Process. Cleaning and cement lining in place has been a successful remedy for over 1,000 miles of water supply pipelines. Centriline hasn't lost a patient yet.

CENTRILINE CORPORATION

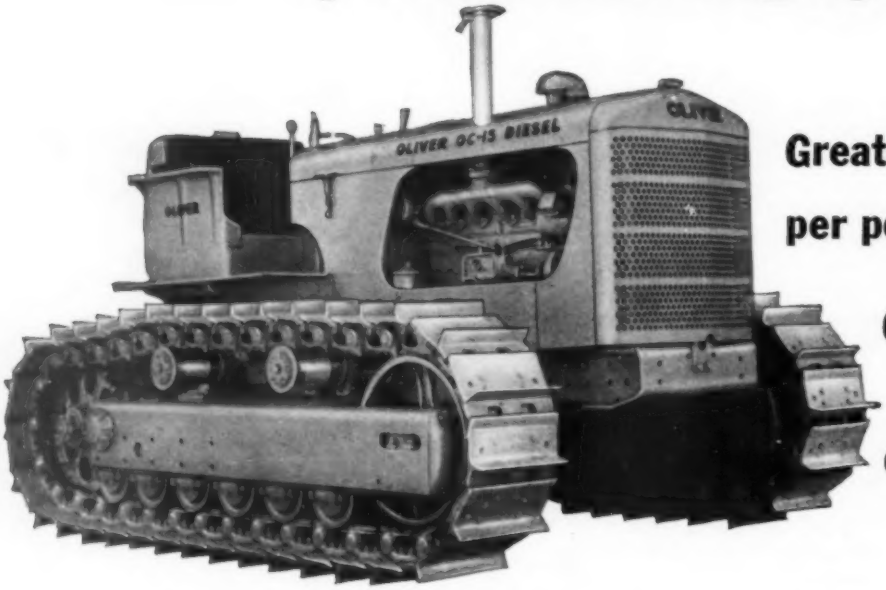
A subsidiary of the Raymond Concrete Pile Company

140 CEDAR STREET, NEW YORK 6, N.Y.
WOrth 2-1429

Branch Offices in Principal Cities of the United States, Canada, and Latin America.

OLIVER

presents the mighty OC-15



Greatest horsepower per pound of tractor

Greatest return per dollar invested!

In nationally recognized official tests, the OC-15 came out first for power against every other tractor in its size class. It's the power leader *any way you rate it!* In total, the OC-15 is the most powerful, performance-packed, profit-making crawler for its size yet. It's 1958 modern...and ready for you right now!

- Greatest power to weight ratio...a full 110 net engine h.p. High-torque, 529-cubic-inch diesel.
- Has more reserve power—you work faster, more efficiently with any mounted attachment.
- Handles wider work range—all at less cost per yard-moved with its fuel-thrifty full diesel. 24-volt starting.
- Long 87¾" crawlers with greater ground contact, higher flotation, tremendous traction! Six lower track wheels.
- Two-track turning action...easy air-steering operation.
- Heaviest-duty, service-saving design—reinforced and trussed at every stress point.
- Compare it on every count—price especially. You'll want the OC-15!

OLIVER **THE OLIVER CORPORATION**

Industrial Sales Div., 19300 Euclid Ave., Cleveland 17, Ohio

a complete line of industrial wheel and crawler tractors and matched allied equipment

Equipment News

CONTINUED FROM PAGE 19A

Right Angle Gear Motors

212

Sterling Electric Motors, Los Angeles, California, has announced a new line of right angle gear motors from ¼ through 5 horsepower in all enclosures.

Gear case and motor housings are of #319T6 alloy of aluminum. This heat treated aluminum casting absorbs the high torque characteristic of gear motors, has

good heat transfer properties and is corrosion-resistant. The worm wheel is hobbed from high-grade gear bronze, while the worm itself is of high-carbon steel which has been heat-treated and polished. High thrust and radical capacity is obtained through tapered bearings on the output shaft which assures alignment and avoids damaging pre-loading conditions. Ball bearing construction is used throughout the rest of the motor. Double-positive oil seals are used on both the input and output shafts to assure many years of leak-free operation.

Submergible Pump

213

Reda Pump Company, Bartlesville, Okla., has developed a new submergible pump that will supply from 20 to 76 gallons per minute for 4 in. I.D.

The new "D-52T" model Reda submergible pump is available in 1, 2, 3 and 5 horsepower models, to provide high water capacities from wells as deep as 300 feet. The pump is of corrosion resistant construction and

CONTINUED ON PAGE 23A

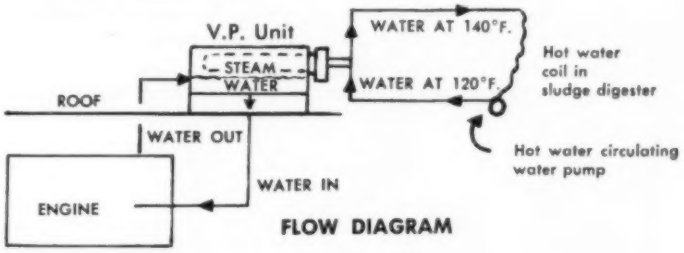
VAPOR PHASE® ELIMINATES NEED FOR GAS SCRUBBERS

COMPLETE VAPOR PHASE® Heat Recovery and Cooling Systems Designed and Furnished by Engineering Controls

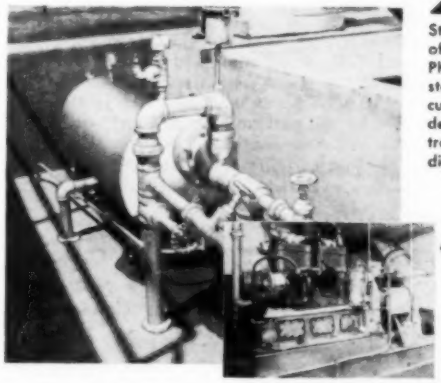
at San Bernardino Sewage Treatment Plant

Three engines (100 hp Enterprise, 160 hp Worthington, and 60 hp Buda) are operating at this treatment plant on 100% untreated sewage sludge gas.

Under normal operating conditions the H_2S gas content would be sufficient to stick piston rings in a few days. At the elevated Vapor Phase temperature (212°F.), however, acid cannot form — since the water jackets are always well above the dew point (194°F.).



FLOW DIAGRAM



Stream of water is pumped through set of coils in sludge digester to Vapor Phase unit which has tube bundle in steam dome. As water in secondary circuit flows through tube bundle it condenses steam, thus cooling engines and transferring jacket waste heat to sludge digesters.

Note the combination of the vapor phase separator and condenser, designed for use on the 60 hp Buda engine (inset). This engine has already operated for over 112,000 hrs. In this engine, as with the others in this installation, maintenance costs have been extremely low.

"Sole Developers and Manufacturers of Vapor Phase® Thermal Circulation (Ebullition) Engine Cooling Systems".

E C VAPOR PHASE

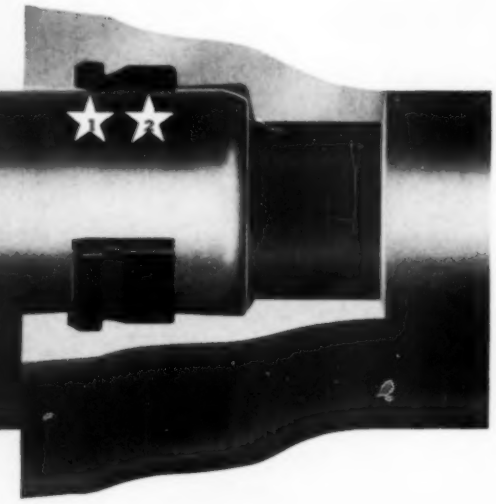
ENGINEERING CONTROLS, Inc.

AN AFFILIATE OF ST. LOUIS SHIPBUILDING & STEEL CO.

611 E. Marceau, St. Louis 11, Mo.

1939 N. Hillhurst Ave., Los Angeles 27, Calif.

NEW! AMERICAN Fastite** ® JOINT* CAST IRON PIPE



The superior double-sealing☆☆ single gasket type joint

Exclusive dual-density rubber gasket provides a long-life, leak-free cast iron pipe installation...

1. Hard rubber end provides a strong shoulder for self-centering and self-locking—a permanent seal against cold flow under pressure, fully protected against weathering and deterioration.
2. Softer large end for positive compression, liquid-tight joint sealing and easy assembly.

Tests prove either hard or soft rubber section *alone* provides a positive seal.

The American Fastite Joint* is an all-weather-laying joint. The exclusive gasket—available *only* with Fastite pipe—is self-centering, self-locking, and leak-proof. Increased internal pressures actually increase joint tightness whether pipe is laid in straight alignment or deflected.

Every feature of new American Fastite Joint* Cast Iron Pipe has been scientifically designed, laboratory and field tested, and manufactured to exact specifications with the objective of combining speed and ease of assembly with permanent, leak-free joints. Feature for feature, compare the new American Fastite Joint* with any other pipe joint now available. An American Cast Iron Pipe Company representative will be glad to tell you about the unique advantages to be had only in American Fastite Joint* Cast Iron Pipe.

FREE BOOKLET

Write for your free copy of a new booklet describing American Fastite Joint* Cast Iron Pipe. No obligation.

*Patent applied for—Underwriters' Laboratories, Inc., approved.

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AMERICAN CAST IRON PIPE CO.
BIRMINGHAM 2, ALABAMA

Equipment News

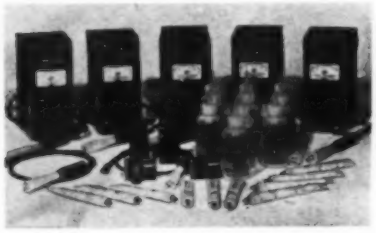
CONTINUED FROM PAGE 21A

includes all-bronze impellers and ni-resist diffusers. This new model is the latest addition to the wide range of Reda Submergible pumps in sizes from ⅓ to over 300 horsepower.

pH Meter Package for Multi-station Use

214

Analytical Measurements, Inc., Chatham, New Jersey, has available a complete pH package for multi-station use. The kit includes 5 portable instruments with carrying cases and buffer solutions, 2 buffer kits, 2 extra probes and 2 sets of batteries.



Many inter-department trips are eliminated since each department can have its own meter for instant checking. The growing need for multi-station pH control has prompted the sale of these meters in a package plan.

Corrosion-Proof Flowmeter

215

Fischer & Porter Co., Hatboro, Pa., has developed a rugged, corrosion-proof variable-area flowmeter with vitreous enamel-lined fittings. Fused to the inner surface of the cast iron fittings, the new glasslike lining is extremely tough.

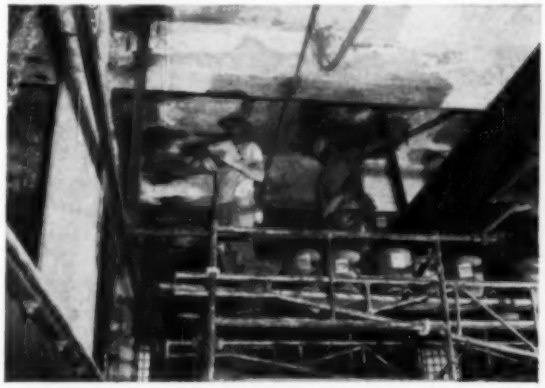
The meter will handle corrosive fluids formerly handled only by rubber-lined, porcelain, hard lead, and special alloy meters. At the same time, it will stand up to temperatures and shocks that meters fabricated of the more fragile materials would not take.

CONTINUED ON PAGE 109A

How THORITE and THOROSEAL made this underground structure sound again!

Workmen prepare old surface for patching with THORITE.

Water has entered the concrete and caused corrosion of reinforcing rods, blistering the concrete off surface and causing structural weakness throughout building.



Reinforcing was cleaned, all corrosion was removed and brush coat of THORITE applied over entire patching area, then filled in with trowel coats of THORITE, even with surrounding surfaces.

THORITE Patching Mortar sets in 20 to 30 minutes and can be coated with THOROSEAL while hardening.

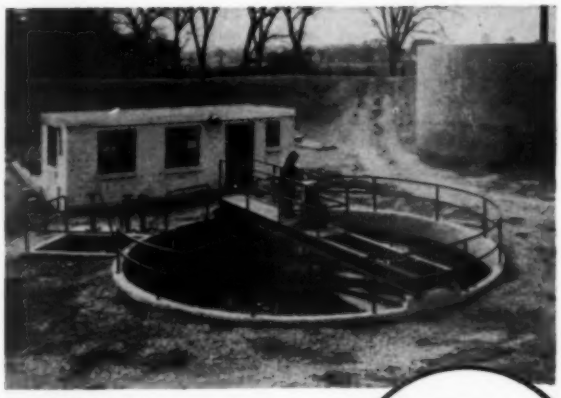
"How to do it" GET OUR 16 PAGE BROCHURE

STANDARD DRY WALL PRODUCTS, INC.
NEW EAGLE, PENNA. CENTERVILLE, IND.

The percentages are right with

INFILCO *High-Rate* SEWAGE TREATMENT

100%.. ..Faster
50%.. ..Less Space
90-95%.. ..B.O.D. Removal



BIOSORPTION® activated-sludge plant for treatment of sewage at Collinsville, Okla.

Consulting Engineers: WOOD & CRAIG Tulsa, Okla.

COLAFLEX® diffuser

INFILCO's improved activated-sludge equipment for *high-rate* sewage treatment is the answer to problems of maximum volume from minimum space—highest efficiency at lowest cost.

Complete treatment requires only five to six hours as compared to 10 to 12 hours in conventional plants. Area required is scarcely half as much. Expenses for property, construction, and operation are substantially reduced. And all this without sacrifice in efficiency. Here are typical operating figures from the installation in Collinsville, Okla.—

EFFICIENCY

Date	Ave. Flow MGD	Average B.O.D. Raw Sewage	Average B.O.D. Final Effluent	Average B.O.D. % Removal	Suspended Solids Raw Sewage	Suspended Solids Final Effluent	Suspended Solids % Removal
1/14-2/3, '55	.069	287	21	92.7	335	22	96.5

These figures indicate what can be accomplished in treatment of sewage for institutions or small communities. If you have such a problem, consult INFILCO, because

INFILCO KNOWS HOW to help you solve it.

Over 60 years of experience and the most complete and advanced line of equipment are available to you. Write today for full information on the interesting Collinsville installation and Bulletin No. 6550 -WS-26.

Inquiries are also invited on all other water and waste treating problems including coagulation, precipitation, sedimentation, filtration, flotation, aeration, ion exchange and biological processes.

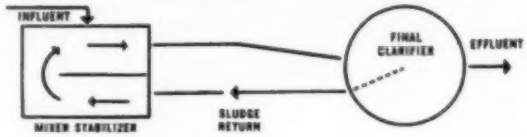
INFILCO INC.
General Offices
Tucson, Arizona

The ONE company offering equipment for ALL types of water and waste treatment.

FIELD OFFICES THROUGHOUT THE UNITED STATES AND IN FOREIGN COUNTRIES

0930

FLOW DIAGRAM: DESIGN AVERAGE FLOW 0.21 M.G.D.



COLAFLEX® diffusers in mixer-stabilizer

HERSEY

WATER METERS

With more than 73 years experience, you are assured of long and continuous service, accurate registration, and lowest possible maintenance cost.

Hersey never cheapens the quality of its meters to meet price competition.

HERSEY MANUFACTURING COMPANY

DEDHAM, MASS.

BRANCH OFFICES: NEW YORK — PORTLAND, ORE. — PHILADELPHIA — ATLANTA — DALLAS — CHICAGO
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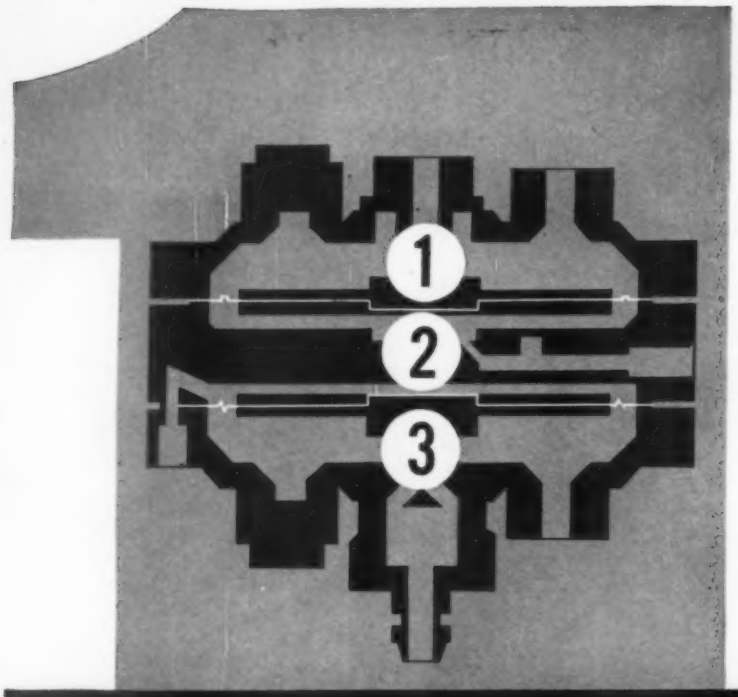


3-in-1 REGULATOR STACK*

simplifies construction, minimizes maintenance of F & P chlorinator

The simplicity of F & P Model 1050A Chlorinator is truly an outstanding example of modern instrument engineering. Originally designed with individual regulators, the first F & P Chlorinators were vastly superior to any other chlorinators then on the market. Taking advantage of their product lead, F & P engineers continued researching optimum chlorinator design and performance, and came up with a new idea—*stacked regulators!*

The 3-in-1 regulator stack shown above combines (1) differential pressure regulator, (2) vacuum breaker and pressure relief, and (3) vacuum regulator and safety shutoff into one convenient unit. This design simplifies the flow system by reducing the amount of piping required and arranging the regulator components in line . . . in one, easy-to-service package. Components are made and tested separately . . . assembled . . . and then retested as an integrated unit. *F & P is the only company able to offer this 3-in-1 regulator feature.*

*Patent applied for.

Other features that make this F & P chlorinator an outstanding buy in trouble-free performance and economy include: dependable, positive-acting safety system . . . direct reading flowmeter—you see the rate of flow! . . . built-in capacity flexibility, ranging from 0.1 ppd to 2000 ppd . . . construction materials completely inert to chlorine corrosion . . . accuracy well within ±4% . . . no special skills required to install or operate.

The fiber glass plastic cabinet, available in a variety of colors, is completely resistant to corrosion . . . never requires painting or coating.

Get all the facts on the performance-tested Model 1050A Chlorinator by writing for Catalog 70C140. If you're from Missouri, we'll be happy to send you a list of see-it-for-yourself installations. Write Fischer & Porter Company, 228 Fischer Road, Hatboro, Pa. In Canada, write Fischer & Porter (Canada) Ltd., 2700 Jane Street, Toronto, Ontario.

FP

FISCHER & PORTER CO.

Complete Process Instrumentation

New Bulletins *AVAILABLE FREE*

Water Gates

216

Armco Drainage & Metal Products, Inc., Middletown, Ohio, has just published a new illustrated bulletin that shows how this supplier's complete line of gates meet municipal water and sewage control requirements. Some of the subjects covered are watertightness, economical selection, fast, easy operation, and long service life. Size range and operating pressures are listed and accessories and related products described. Among the applications are sewer outfalls, pumping stations, culvert drainage, flood control, reservoirs, recreation ponds, levees, and cooling towers.

Flow Colorimeter

217

Beckman Process Instruments Division, Fullerton, Calif., has announced the availability of a new brochure on the Model 77 Flow Colorimeter.

The bulletin gives descriptions and specifications for the standard Beckman Flow Colorimeter and for the new, improved ratio recording flow colorimeter. The instruments described continuously measure color intensity, turbidity, or chemical concentration in a wide variety of process streams.

Grit Collecting and Washing

218

Link-Belt Co., Chicago, Ill., has just published a booklet on Grit Collecting and Grit Washing Equipment. This 28-page book is profusely illustrated, tab indexed, and three-hole punched for permanent retention in the Link-Belt Sanitary Engineering Binder.

The book contains design data on seven types of grit collectors, two grit washers, and the Tritor screen, which is a combination grit collector and mechanical screen manufactured by Link-Belt Company. Essential equipment is shown for numerous applications. Detail drawings and specifications are included to assist the engineer in the preparation of his drawings and specifications. The designs include velocity controlled chambers for shallow or deep chambers, chambers with dewatering and washing screws or inclined plane dewatering troughs.

Filtration Equipment

219

Commercial Filters Corp., Melrose, Mass., has released a new catalog on Fulflo and CFC Filtration Equipment for micronic clarification of all types of fluids.

The catalog describes and illustrates each type of Fulflo Filters which employ Honeycomb Filter Tubes in single or multi-tube arrangement. A wide range of densities allows for filtration to any degree of micronic clarity.

The CFC Filters described include Honan-Crane and Michiana models, models for surface full-flow filtration and for by-pass applications. In addition, CFC Filters are available for filtration of dissolved as well as solid impurities. Also included are models for clarifying coolants, magnetic separation, conditioning insulating oil and other similar applications.

Multi-Stage Pumps

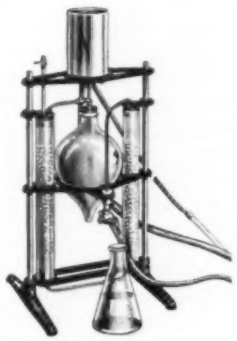
220

Economy Pump Div., C. H. Wheeler Manufacturing Co., Philadelphia, Pa., has published a new catalog describing the company's line of vertically split case, multi-stage pumps.

The two-color, 4 page bulletin shows design and construction details, performance curves and metallurgical details, of two types of pumps—the CS and the NAS. According to the catalog, applications of these pumps include general water supply, boiler feeding, ice water and brine circulation, pneumatic water systems, sprinkling systems and a wide variety of clear-liquid uses. Heads range to well over 600 feet, capacities to 320 gpm.

CONTINUED ON PAGE 28A

switch to
Anthrafilt
Trade Mark Reg. U.S. Pat. off.
THE MODERN ALL-PURPOSE
FILTERING MEDIUM
Best for All Types of Filters
ANTHRAFILT
offers important advantages over sand and quartz
DOUBLES length of filter runs.
REQUIRES only half as much wash water.
KEEPS filters in service over longer periods.
INCREASES filter output with better quality effluent.
GIVES better support to synthetic resins.
PROVIDES better removal of fibrous materials, bacteria, micro-organic matter, taste, order, etc.
IDEAL for industrial acid and alkaline solutions.
EFFECTIVE filtration from entire bed.
LESS coating, caking or balling with mud, lime, iron or manganese.
Write for further information, test samples and quotations to:
PALMER FILTER EQUIPMENT CO.
P. O. Box 1696—822 E. 8th St., Erie, Pa.
Representing
ANTHRACITE EQUIPMENT CORP.
Anthracite Institute Bldg.,
Wilkes-Barre, Pa.

ENSLOW
STABILITY INDICATOR

For checking the equilibrium of a finished water, and supplying an index useful in controlling anti-corrosion treatment. Catalog No. 83-895
WRITE:
Phipps & Bird, Inc.
P. O. Box 2V Richmond 5, Va.

for heavy duty
CORROSION PROTECTION
in water and sewage works

PHENOLINE 305

- 85% solids content
- Needs only 2 coats (12 mils)
- Gives 2-3 times longer life, eliminates 1-2 recoating cycles
- Costs less to apply
- Can be brushed or sprayed

Phenoline 305 forms a tough, non-porous maintenance coating that protects against the corrosive effects of hydrogen sulfite, sulfuric acid, water, chemicals, and acidic sewage and wastes. It gives effective, economical protection to equipment exteriors, concrete and steelwork.

Here's rugged, heavy-duty, long-lasting maintenance protection against severe corrosive conditions. And because fewer coats give greater thickness, Phenoline 305 actually costs less than many so-called "cheaper" protective coatings. Use CARBOLINE's ENGINEERING APPROACH — compare cost per sq. ft. per year of service.

Write today for Bulletin 600 with complete information on this superior heavy-duty corrosion protection — Phenoline 305.

PHENOLINE 305

carboline COMPANY

32-N Hanley Industrial Ct.
St. Louis 17, Mo.

Manufacturers of
PHENOLINE, POLYCLAD,
RUSTBOND PRIMERS

New Bulletins

CONTINUED FROM PAGE 27A

Gasket Type Joint Cast Iron Pipe

221

American Cast Iron Pipe Co., Birmingham, Ala., has just published a brochure on American "Fastite" Joint Cast Iron Pipe.

According to the brochure, American Fastite joint pipe for water, sewage and other liquid service has all the long-life, high strength qualities inherent in regular Mono-Cast pipe produced centrifugally in sand-lined molds. In addition, the customer is afforded the lower joint cost and time saving advantages in laying a dependable double-sealing single gasket type joint.

The brochure gives a complete description of the pipe joint, photographs and text show the proper methods of assembly in the field, specifications and photograph of typical installations.

Tables containing weights, working pressures and recommended deflections are also included.

Wrought Iron Piping

222

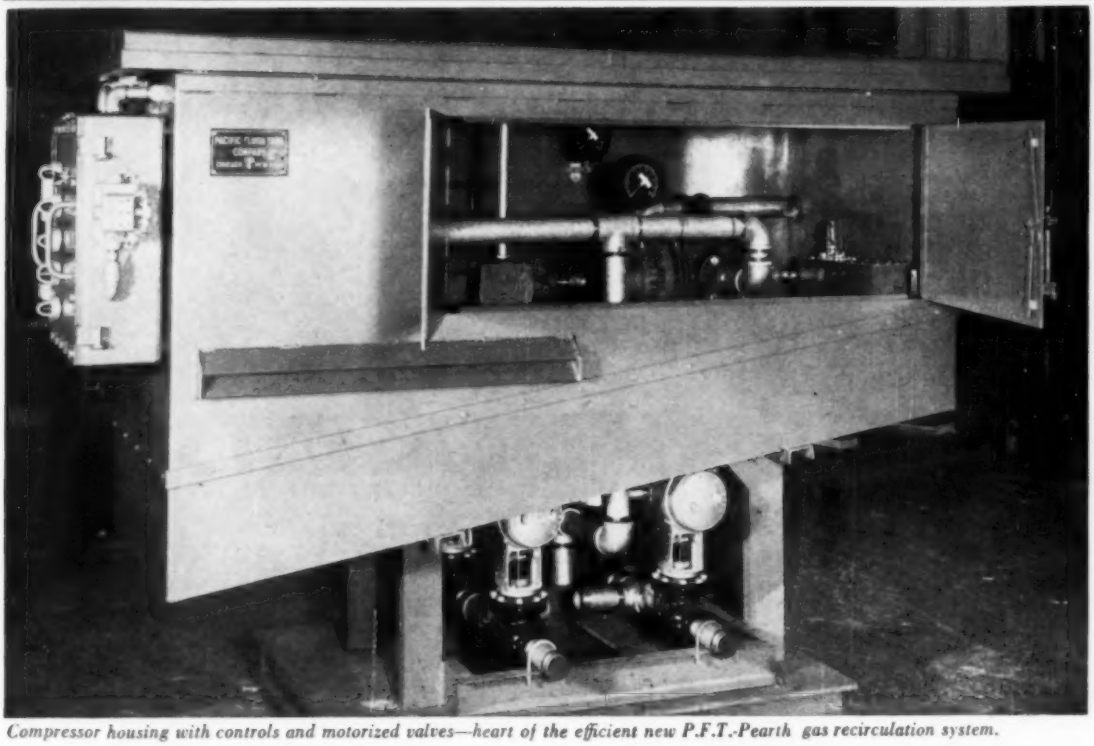
A. M. Byers Company, Pittsburgh, Pa., has announced availability of an 8-page booklet entitled "Wrought Iron O. D. Piping," documenting more than a score of typical commercial and industrial wrought iron pipe installations.

These case histories are selected to show genuine wrought iron's durability under a wide variety of operating conditions. Featured in the case histories is the colorful story of the famous wrought iron siphon installed in 1873 (and still in use today) to transport water from high in the Sierra Nevada's to parched Virginia City, Nevada, then at its height as the center of rich Comstock Lode mining activities.

ASTM specifications under which Byers pipe is manufactured are contained in the booklet, as photo-micrographs showing the physical structure of the material.

P.F.T.

NEW DEVELOPMENTS IN SEWAGE TREATMENT



Compressor housing with controls and motorized valves—heart of the efficient new P.F.T.-Pearth gas recirculation system.

Eliminate scum, improve digestion with P.F.T.- Pearth gas recirculation system

Low cost insurance against possible scum difficulties. Future installation of Pearth system, without interruption of digester operation, is simple and economical when optional discharge wells are specified for new P.F.T. Floating Covers.

This new gas recirculation method eliminates scum, thereby increasing digester capacity. Compressed digester gas is injected through properly spaced discharge wells into the zone below the scum layer. Entrained gases shake loose, causing solids to sink into the active digestion area. This also hastens the digestion process.

There are no moving parts in the digester, and no restrictions in the open end gas discharge piping. Hence, no danger of mechanical failure or clogging with this trouble-free system.

P.F.T. supplies the special gas compressor, all necessary explosion controls, low and high pressure gas safety controls, and all inter-connecting and discharge piping. This improved system is the most efficient, yet least costly, method of scum control. It is available only through P.F.T.—as an integral part of, or as an attachment to the standard P.F.T. Floating Cover.

For more information, write today for the illustrated technical study, *"Scum Control in Sludge Digestion."*

waste treatment equipment exclusively since 1893

P.F.T.

PACIFIC FLUSH TANK CO.

4241 Ravenswood Avenue

Chicago 13, Illinois

PORT CHESTER, N. Y. • SAN MATEO, CALIF. • CHARLOTTE, N. C. • JACKSONVILLE • DENVER

In HIDALGO COUNTY, TEXAS

Engineers specify

TYLOX

Rubber PIPE GASKETS

to

- ***PREVENT JOINT LEAKS***
- ***REDUCE CONSTRUCTION COST***
- ***LENGTHEN LIFE***

of 46-mile irrigation line

The Hidalgo County job called for 240,000 lineal feet of pipe, requiring 40,000 or more joints. *Fast-working* joints were necessary to keep construction costs down. *Water-tight* joints were a "must," to prevent leakage of vital irrigation water. *Non-deteriorating* joints were essential, to remove the danger of failures which might interrupt service and thereby damage crops.

The question "what joint?" to meet *all* three requirements effectively, was quickly decided by the officials. TYLOX—which makes pipe joints leak-proof with a rubber-tight, compression seal, cuts construction costs by speeding pipe laying, and never deteriorates because of special compounding of its rubber—was the *only* pipe joint able to fill the bill. By specifying TYLOX, officials assured most for the taxpayer's money on all three counts.

✻ **PROJECT:** Irrigation line—Hidalgo County Water Control and Improvement District No. 16, Mission, Texas.

ENGINEERS: Charles L. Melden, Civil Engineer, Edinburg, Texas, and A. Tamm, Consulting Engineer, Harlingen, Texas.

CONTRACTOR: Heldenfels Bros., Corpus Christi, Texas, and F. M. Reising, Edinburg, Texas, Sub-Contractor.

PIPE: T & G Concrete, sizes 12" to 30", supplied by Longhorn Concrete Pipe Company, Edinburg, Texas.

Write today . . .

for more details and illustrated TYLOX performance histories. Specify TYLOX for **your** pipe jobs.

5043

HAMILTON KENT
MANUFACTURING COMPANY
KENT, OHIO
427 West Grant St. ORchard 3-9555

Safe, sure protection . . .

Pennsalt Water Works Grade Chlorine

There's no room for guesswork in water treating. Pennsalt helps you to be *sure* . . . and gives you other important benefits too . . . at no extra cost.

Consistent high purity . . . Pennsalt water works grade chlorine is made in modern controlled-process plants. To insure absolute adherence to water works standards, it is taken through an extra fractionating column for higher purification.

Safe, sanitary packaging . . . All returned chlorine containers are carefully reconditioned and inspected before being filled by Pennsalt.

Ample supply . . . As a major chlorine producer, Pennsalt expands its capacity on a planned basis. When your needs grow, you'll find Pennsalt ready to supply your added demand.

Dependable delivery . . . Pennsalt has nearly a half century of specialized chlorine shipping experience.

Pennsalt water works grade chlorine is available in 100- and 150-lb. cylinders, and in one-ton containers in multiple-unit tank cars. Call or write Pennsalt for fast service.

FOR FAST SEDIMENTATION IN YOUR SEWAGE PLANT . . . use Pennsalt FERRIC CHLORIDE, Anhydrous or Liquid.

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Regional Offices:
Chicago • Detroit • New York • Philadelphia • Pittsburgh • St. Louis
District Offices: Appleton • Cincinnati • Atlanta
Representatives: Airco Company International, New York
Pennsalt Chemicals of Canada Ltd., Hamilton, Ontario

Pennsalt Chemicals
ESTABLISHED 1850

See our Catalog in CMC

In the West, Pennsalt inorganic chemicals are available through Pennsalt of Washington Division, with plants at Tacoma, Washington and Portland, Oregon.

Carter Equipment

for the treatment of

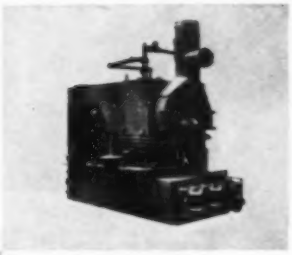
water, sewage and industrial wastes

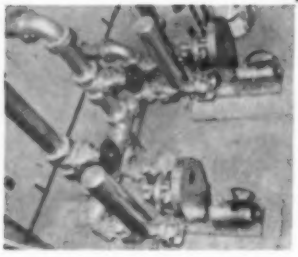
CLARIFIERS

ROTARY DISTRIBUTORS

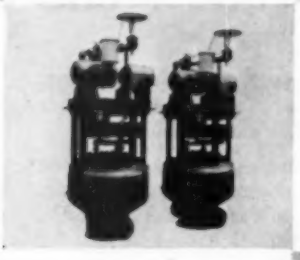
FLOATING ROOF DIGESTERS

HEAT EXCHANGERS





SLUDGE PUMPS



PNEUMATIC EJECTORS

for the Engineer who demands the finest of its type!

Write for complete information and data on the mechanisms shown here. Our engineers and field specialists are available for consultation in applying any of this equipment to your specific needs.

WALKING BEAM FLOCERS

RALPH B. CARTER COMPANY
201 ATLANTIC STREET, HACKENSACK, NEW JERSEY

How a Four-Man Crew laid 1500 feet a day of CLOW Bell-Tite® pipe through Florida swampland

CLOW cast iron pipe, with the sensational Bell-Tite joint, proved its advantages conclusively in this Clearwater, Florida, installation.

That a four-man crew was able to lay this CLOW Bell-Tite pipe at 1500 feet a day under these adverse conditions is definite evidence of the time, labor and money-saving advantages of this CLOW-designed joint. Two men worked in the trench—often in 3 feet of water. One man lubricating and aligning the joints, the other assembling with a pinch bar. A crane operator and a hook-up man completed the crew.

CLOW Bell-Tite forms a pressure-tight joint—instantly—no bolts or follower glands required. Under practically all conditions, it is the fastest, easiest and most economical pipe for water main installation. Underwriters' Laboratories Inc. listed in diameters 3- through 24-inch.

Shows simple assembly of CLOW Bell-Tite joint. Just wipe clean, lubricate and push spigot into the bell. When painted yellow stripe is no longer visible, joint is bottle tight.

Under-water assembly of 8" Bell-Tite pipe at Clearwater, Fla.
Contractor: Hancock Pipe Company, Clearwater, Fla.

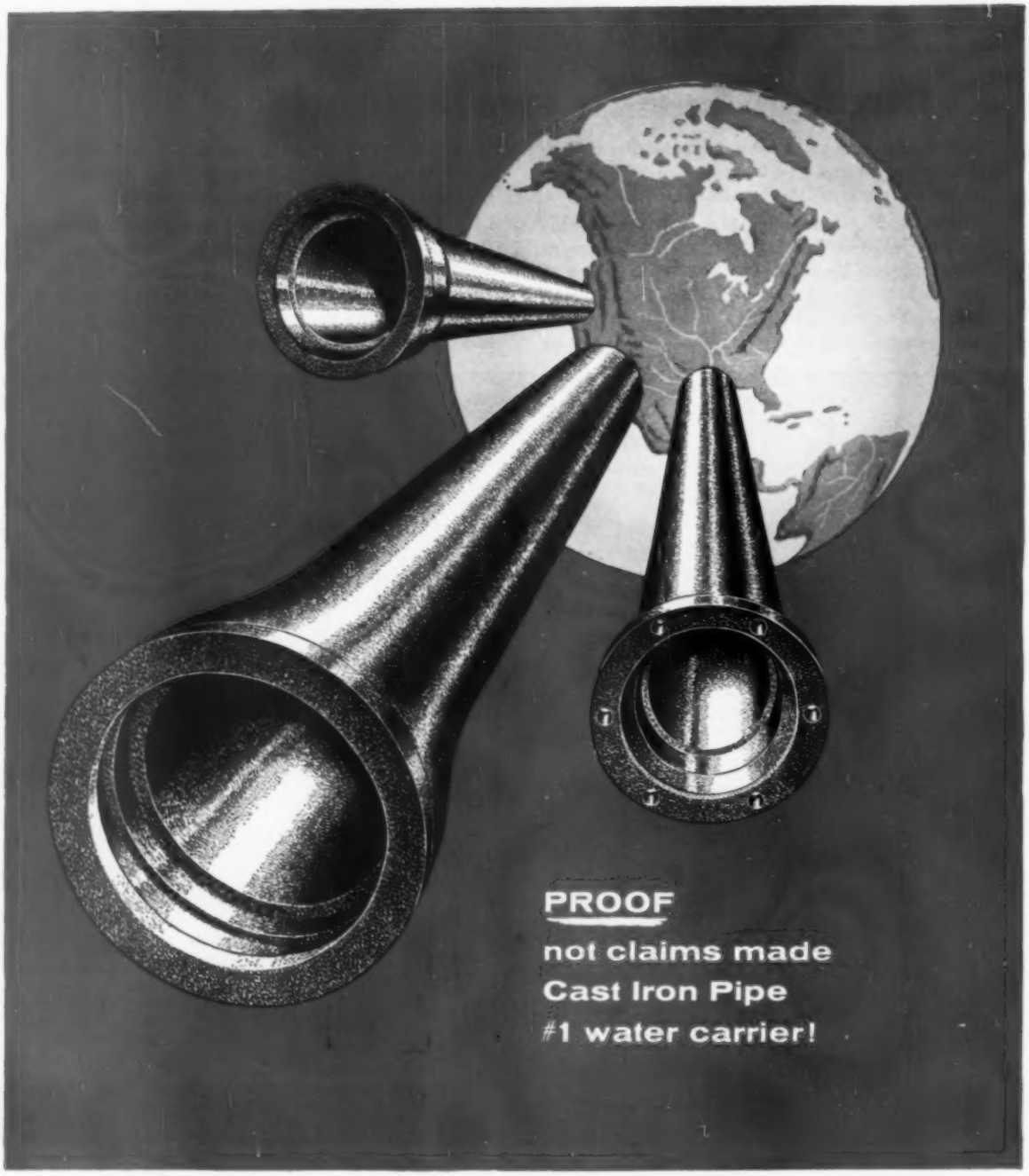
JAMES B. CLOW & SONS, Inc.

CLOW 1878

201-299 North Talman Avenue, Chicago 80, Illinois

Subsidiaries:
Eddy Valve Company, Waterford, New York
Iowa Valve Company, Oskaloosa, Iowa

TAKE THE DOUBT



MODERNIZED **cast iron**

OUT OF PIPE BUYING

Specify Modernized Cast Iron Pipe and be SURE!

6 reasons why Cast Iron Pipe is #1 choice of U.S.A.

1. **EXTERNAL LOAD RESISTANCE...**
   6" Class 150 Pipe withstands a crushing load of 17,900 pounds per foot . . . nearly 9 tons.

2. **HIGH FLOW CAPACITY...**
   Cement lined cast iron pipe and fittings will not tuberculate . . . delivers a full flow for the life of the pipe.

3. **LONG LIFE...**
   42 North American cities are still using cast iron water mains laid 100 years and more ago. Hundreds more have passed the 50 year mark.

4. **BEAM STRENGTH...**
   Cast Iron Pipe is inherently tough . . . stands up under heavy traffic load, soil displacement and disturbance.

5. **CORROSION RESISTANCE...**
   Cast Iron Pipe effectively resists corrosion . . . vital factor in its long life and dependability.

6. **TIGHT JOINTS...**
   A full range of leak-proof, low cost, easy-to-assemble joints for pipe and fittings are available for all conditions.

Before you choose any pipe remember this important fact . . . it will save you many a headache later.

In all the history of water systems no substitute pipe has ever come close to matching cast iron pipe's century old record of dependability, long life and long term economy.

Specify cast iron pipe, and your pipe worries are over, not just beginning. Cast iron's performance is based on PROOF not claims!

THE MAN WHO CHOOSES CAST IRON PIPE TODAY WON'T PAY FOR IT AGAIN TOMORROW!

CAST IRON

Cast Iron Pipe Research Association
Thos. F. Wolfe, Managing Director
Suite 3440, Prudential Plaza, Chicago 1, Ill.

pipe FOR MODERN WATER WORKS

The Mathews barrel, containing all working parts of the hydrant, is readily removed for inspection or repair by simply unscrewing it from the elbow and withdrawing it through the protection case.

I want you to see for yourself how the Mathews replaceable barrel is a real community asset

I can show you easily and quickly with this scale model. See? When a Mathews is broken by a skidding automobile, you can slip in a new barrel in a matter of minutes, *and without excavating*. It's a real safety feature for the community—allows only momentary interruption of neighborhood fire protection.

And these additional quality features help keep the Mathews at the head of the line:

- Compression-type valve opens against water pressure—a positive leakproof construction
- Operating thread cannot be bent
- Head revolves 360° just by loosening bolts
- Nozzle sections are changeable
- Nozzle levels can be raised or lowered without excavating
- Bell, mechanical-joint or flange-type connections
- O-Ring seal furnished when specified

MATHEWS HYDRANTS—by **R. D. WOOD COMPANY**

Public Ledger Building, Independence Square, Philadelphia 5, Pa.

Manufacturers of "Sand-Spun" Pipe (centrifugally cast in sand molds) and R. D. Wood Gate Valves

How to select the best filter rate controller

Unless you check these 7 vital points, you won't be sure you're getting the controller that meets all your requirements

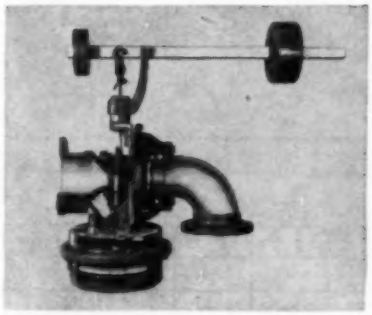
All controllers claim to fill your major requirements:

(1) hold flow at desired rate

(2) operate over wide ranges with low error

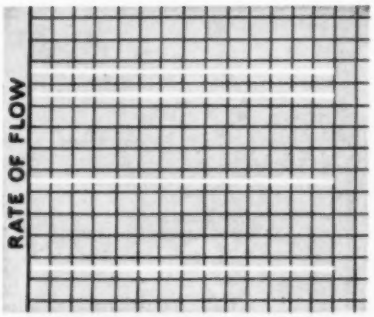
(3) maintain rate *automatically*

But the vital features outlined here determine whether or not you have selected the one type that gives you complete filter control.



1. DIRECT ACTING

Some controllers require pneumatic or electric positioners to hold the desired rate. When power fails, filters run away. But all power can fail and the direct-acting Simplex Type S Controller (cutaway above) still keeps rate uniform.

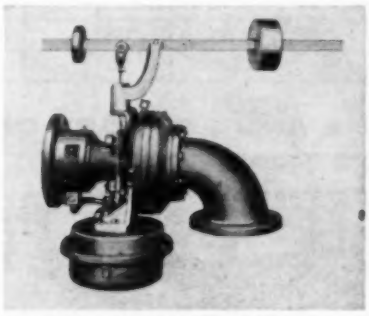


2. ACCURACY TO END POINT

Getting the longest filter run requires the most critical accuracy near the end point. That's where other controllers fail by fluctuating widely. For comparison, see above straight-line accuracy of Simplex Type S Controller.

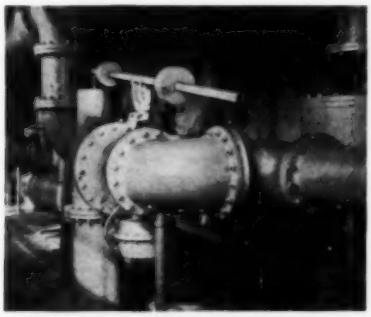
3. PRESSURE LOSS

In other controllers, plates and seats obstruct flow. Above cutaway view of Simplex Controller shows absence of obstructions. Its patented guillotine valve provides the full-line opening that gives you low pressure-loss (under 1' at maximum flow).



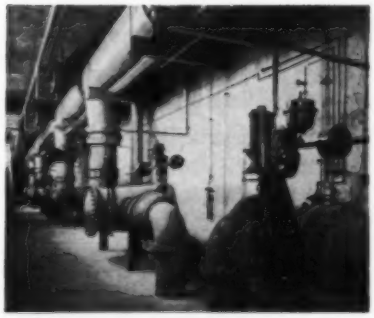
4. TOTAL INSTALLED COST

Other controllers require expensive extras: straight pipe ahead of, or after, the unit; special pneumatic or electric positioners; additional wiring. In contrast, the Simplex Type S Controller is a complete, self-contained unit.



5. SPACE REQUIREMENTS

Controllers that require straight pipe runs waste valuable space, add greatly to plant cost. But, Simplex Type S Controllers are only 3 pipe diameters long, fit anywhere, horizontally or vertically, and eliminate hidden cost of straight pipe runs.



6. MAINTENANCE COST

If used as controllers, ordinary valves require additional positioners—pneumatic or electric. Results: more moving parts; more wear; greater maintenance costs. Simplex Type S Controller is self-contained, operates without these extras, requires virtually no maintenance.

7. PROVEN PERFORMANCE

To help you select the best controller, check with the men who run filter plants. Ask for their experience. Map above shows a few Simplex installations. For others near you—with up to 25 years' successful performance, please write us.

GET THE FACTS ON
SIMPLEX TYPE S CONTROLLERS, TODAY!
SEND FOR FREE TECHNICAL BULLETIN 900

SIMPLEX®

VALVE AND METER COMPANY

A SUBSIDIARY OF PFAUDLER PERMUTIT INC.

Venturi Tubes • Flumes • Meters • Gauges
Transmitters • Controllers • Tables • Air Valves

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Simplex Valve & Meter Co.
7 East Orange St., Lancaster, Pa.

Please send me new Bulletin 900.

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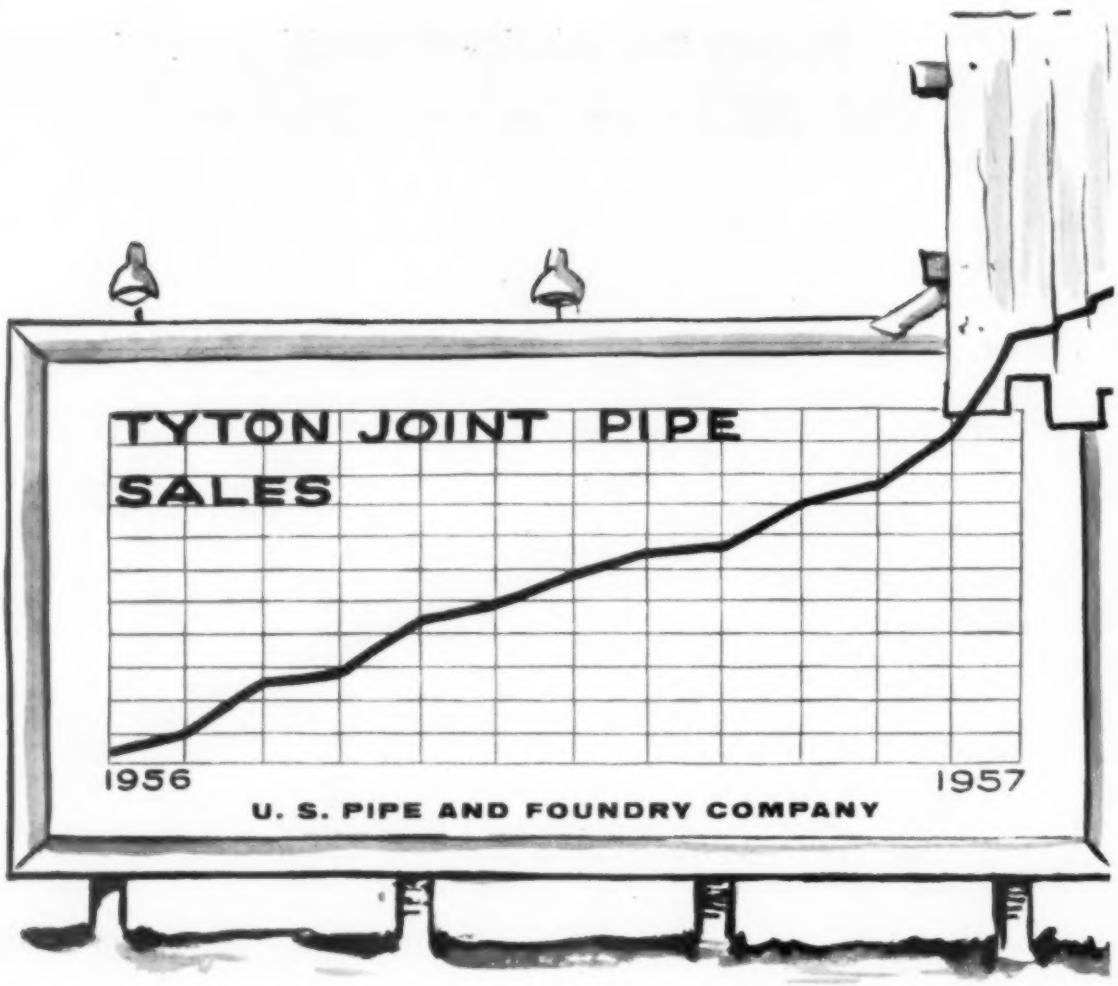


makes friends

Tyton Joint® pipe was introduced a little over a year ago. Since then its acceptance and performance have been phenomenal.

And no wonder. Tyton Joint delivers everything a pipe user needs... and then some. It's easy to assemble—even a green crew gets the hang of it in no time.

Only one accessory needed... a specially designed rubber gasket that seats into the bell. When the entering pipe slides in, the gasket is compressed to give you a

TYTON U.S. cast iron PIPE FOR WATER, SEWERAGE AND

everywhere

permanent, bottle-tight seal. No bell holes. No caulking equipment needed. No nuts or bolts to fasten. No worry about weather, either. You can lay Tyton Joint pipe in rain or wet trench.

Like to know more about "Tyton," the ingenious pipe joint that cuts costs, saves time, sidesteps trouble? Call or write today.

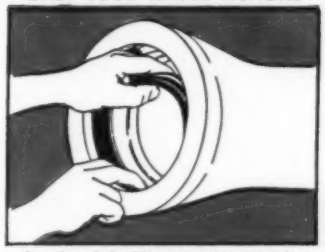
U. S. PIPE AND FOUNDRY COMPANY
General Office: Birmingham 2, Alabama

A WHOLLY INTEGRATED PRODUCER FROM MINES AND BLAST FURNACES TO FINISHED PIPE

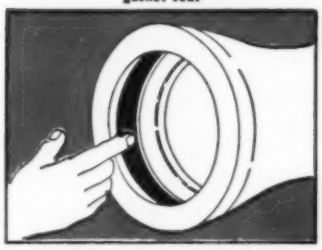
INDUSTRIAL SERVICE CAST IRON

U. S. TYTON JOINT

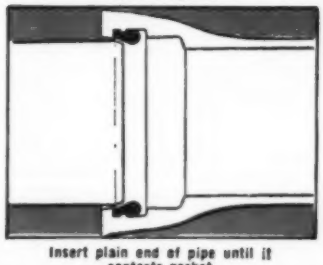
ONLY FOUR SIMPLE ACTIONS



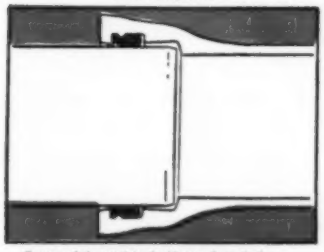
Insert gasket with groove over bead in gasket seat



Wipe a film of special lubricant over inside of gasket



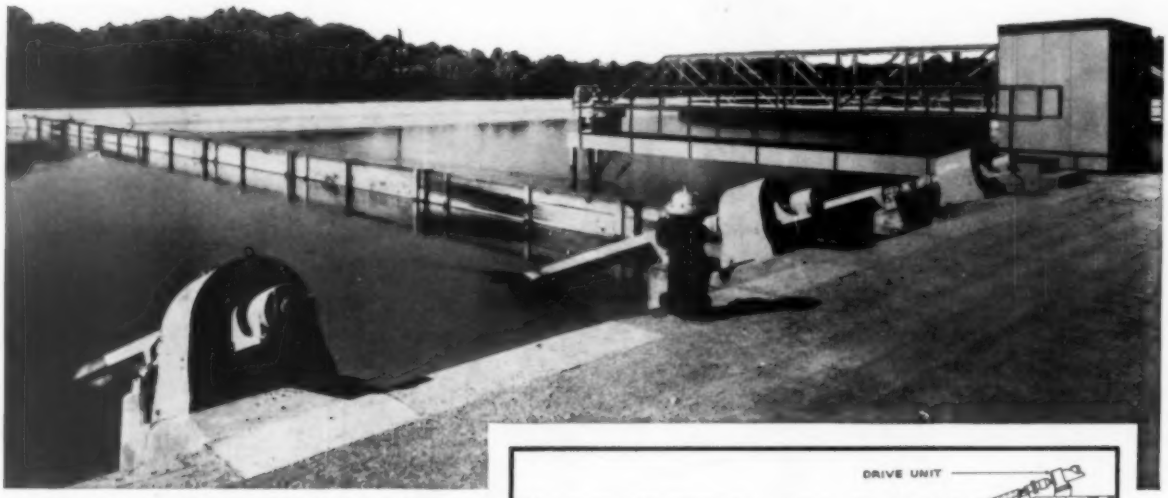
Insert plain end of pipe until it contacts gasket



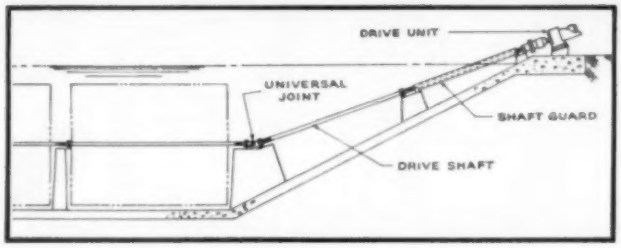
Force plain end to bottom of socket . . . the job's done!

20" Tyton Joint pipe being installed for water supply line in Alabama.

unique FLOCTROL® drive
...new **JEFFREY** *design cuts costs 3 ways*



Three Jeffrey FLOCTROLS at St. Louis County Water Treatment Plant, St. Louis, Missouri, employ unique parallel-to-inclined-sidewall drive arrangement.



Jeffrey sanitary engineers designed the unique FLOCTROL drive shown above. Shaft runs parallel to the inclined sidewall of clarification basin and underwater universal joint is coupled to the horizontal FLOCTROL shaft. Drive shaft is protected at water surface by a steel guard which prevents fouling due to ice formation.

This efficient new Jeffrey FLOCTROL drive affords 3-way savings:

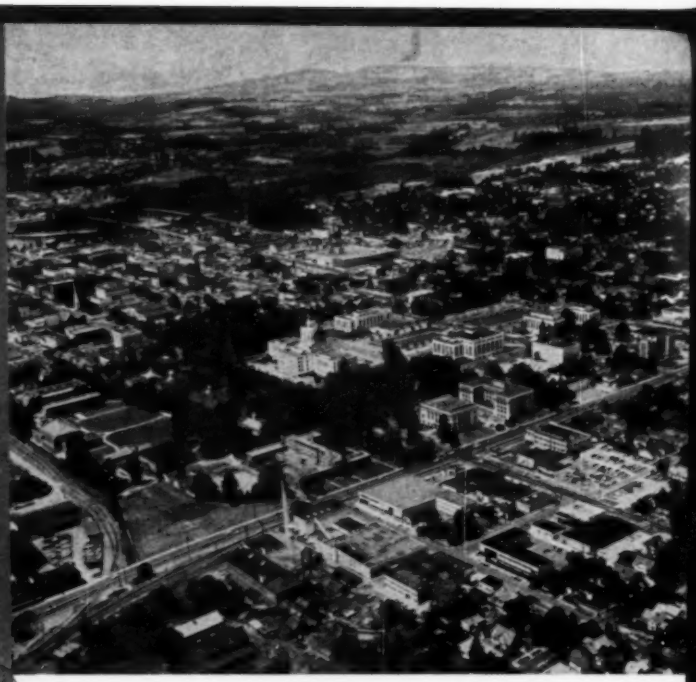
It is less expensive than drives of conventional design • Eliminates costly concrete and steel superstructures • Eliminates undesirable sprocket and chain drive through water.

Jeffrey FLOCTROLS are available in horizontal and vertical types. Horizontal units are usually installed in large plants, vertical units in smaller plants. FLOCTROL Systems eliminate short circuiting through the basin . . . provide tapered mixing for fast floc formation . . . permit 30% smaller basins than are customarily required.

For details on all Jeffrey equipment for water, sewage and industrial waste treatment, write for Catalog 905. The Jeffrey Manufacturing Company, 996 North Fourth St., Columbus 16, Ohio.

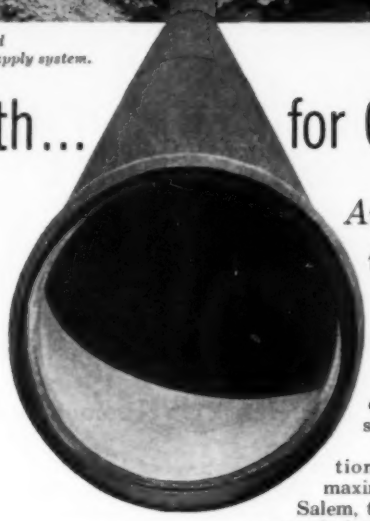
CONVEYING • PROCESSING • MINING EQUIPMENT...
TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

JEFFREY



New Salem pipe line to augment present system will add approximately 50 MGD capacity to city water supply system.

a line of growth... for Oregon's capital city



American Concrete Cylinder Pipe is helping Salem, Oregon to grow

A simple but important fact is that no city, however great its potential, can grow beyond the capacity and dependability of its main water supply system.

Recognizing this fact, and envisioning a population in 30 years that will require three times the maximum capacity of present water transmission lines, Salem, the capital city of Oregon, is carrying out a program designed to meet future needs.

Under the direction of the City's Water Department Manager, John L. Geren, and the technical supervision of Consulting Engineers Clark and Groff of Salem, an 18-mile pipe line of 48" and 54" diameter American Concrete Cylinder Pipe is being installed by Lord Brothers, a general contracting firm of Portland, Oregon. This new line will triple the present capacity of the supply system.

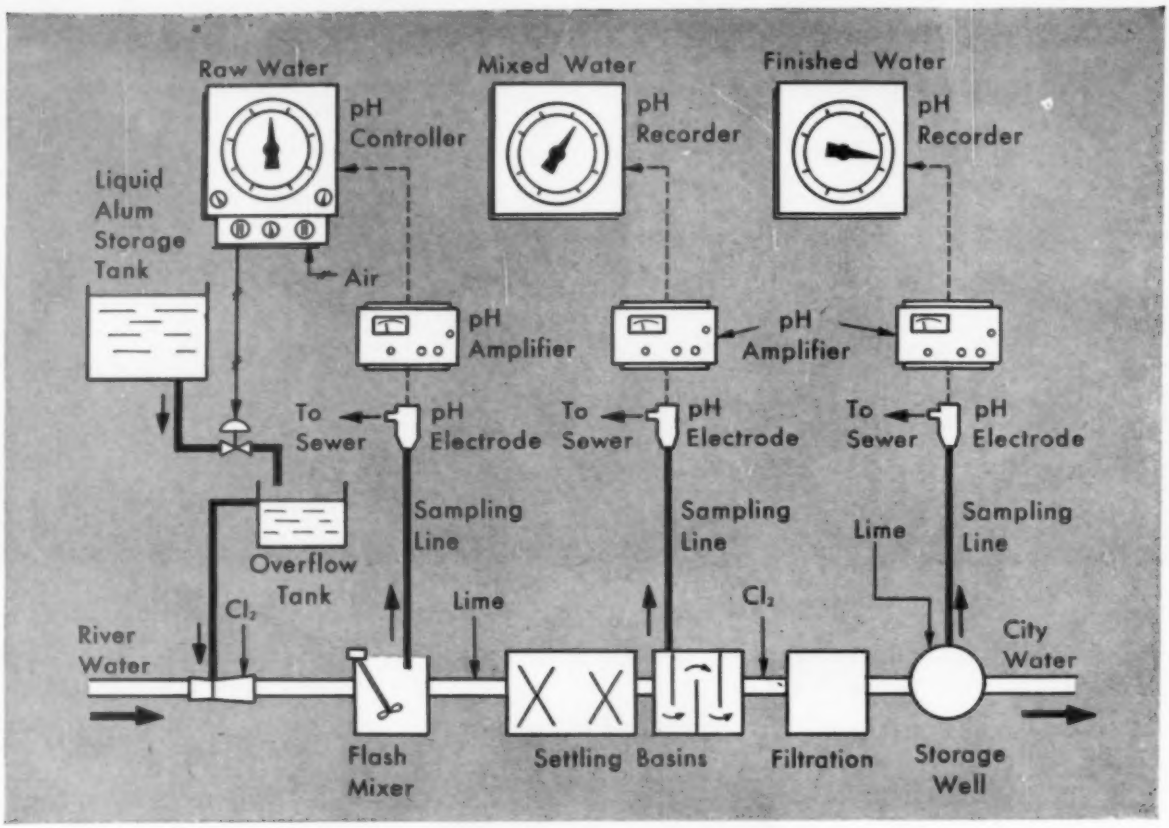
The performance record of this type of reinforced concrete cylinder pipe has been so outstanding throughout the West that Salem can be confident that this water "growth line" will be giving efficient, economical service for many, many years to come.

Strength, permanence, sustained high carrying capacity, and trouble-free service are characteristics of American Concrete Cylinder Pipe which make it the right pipe for this forward looking city.

When planning your future water "growth lines," look to American's quality pipe line products, extensive production facilities and half century of experience.

Ask for complete information concerning the particular class of pipe that will meet your design requirements.

Los Angeles:
P.O. Box 3428, Terminal Annex • LOrain 4-2511
Hayward:
P.O. Box 630 • JEfferson 7-2072
San Diego:
P.O. Box 13 • CYpress 6-6166
Phoenix:
2025 South 7th St. • ALpine 2-1413
Portland:
518 N.E. Columbia Blvd. • BUtler 5-2531



Capacity doubled, chemical costs halved

. . . *with* HONEYWELL *controls at Macon Water Works*

Brown *ElectroniK* pH instruments cut chemical costs by 50 percent, double filtration capacity, and save 200,000 gpd of blow-off water at Macon Water Works.

Treating water of high turbidity and high suspended solids content is no longer a problem at the Macon, Ga. Water Works. With the replacement of a manually-regulated chemical feed system by Honeywell automatic controls, alum and chlorine consumption is reduced by half. These controls reduce turbidity from nine to 1.5 parts per million, doubling filter plant capacity. Red water is eliminated, with a saving of more than 200,000 gpd in blow-off water. Honeywell instrumentation has paid for itself within the first year of operation.

The installation consists of three *ElectroniK* pH instruments. One recorder-controller measures and maintains the pH of water in the flash mixer at the most efficient coagulation value, by automatically adding liquid alum to raw water. The other two instruments measure and record pH of treated and finished water.

For the economical solution to your own water treatment problems, call your nearby Honeywell sales engineer. He's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Aves., Phila. 44, Pa.

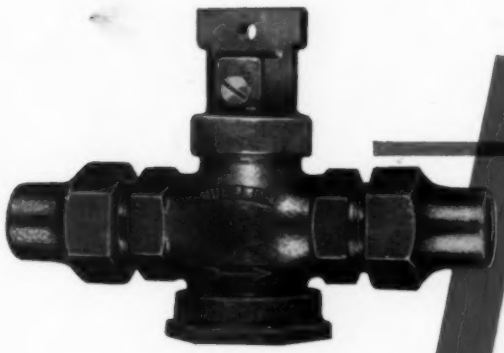
MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

MUELLER®

inverted key curb stops



superior

DESIGN

Steeper key taper provides easier operation. Water pressure exerts an upward force for additional seating action. A downward tap unseats and pressure reseats the key.

MATERIALS

All parts – body, key, coupling nuts, base caps, combined cap and tee, etc. – are cast from high-quality bronze. Leak-proof gasket around base cap prevents leakage.

WORKMANSHIP

All machining is to exacting tolerances. Bodies and keys are precision-fitted and individually lapped. Every stop is tested with air pressure under water.

■ A variety of Mueller Curb Stops is available, with a complete range of inlet and outlet types and combinations. Your Mueller Representative can help you with any Curb Stop problem. Call on him or write direct.

MUELLER CO.
DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles;
In Canada: Mueller, Limited, Sarnia, Ontario

It takes just two steps to assemble the FLUID-TITE Coupling. Lubricate the tapered edge of the gasket. Then slide in the pipe.

Major Advance In Waterworks Industry. K&M's exclusive FLUID-TITE Coupling provides permanent, water-tight, root-tight connections. Allows deflection of up to 5°. Assembled in any weather.

SLIDE IT IN QUICK... IN 2 EASY STEPS

IT'S "K&M" ASBESTOS-CEMENT PRESSURE PIPE WITH EASY-TO-INSTALL FLUID-TITE COUPLING

Installation is fast and economical! It doesn't require skilled labor, heavy machinery, or heavyweight coupling pullers. Install it in any weather.

The seal grows tighter as the pressure climbs! Coupling rings expand as water mains fill. Rings have holes on one side for self-energizing action.

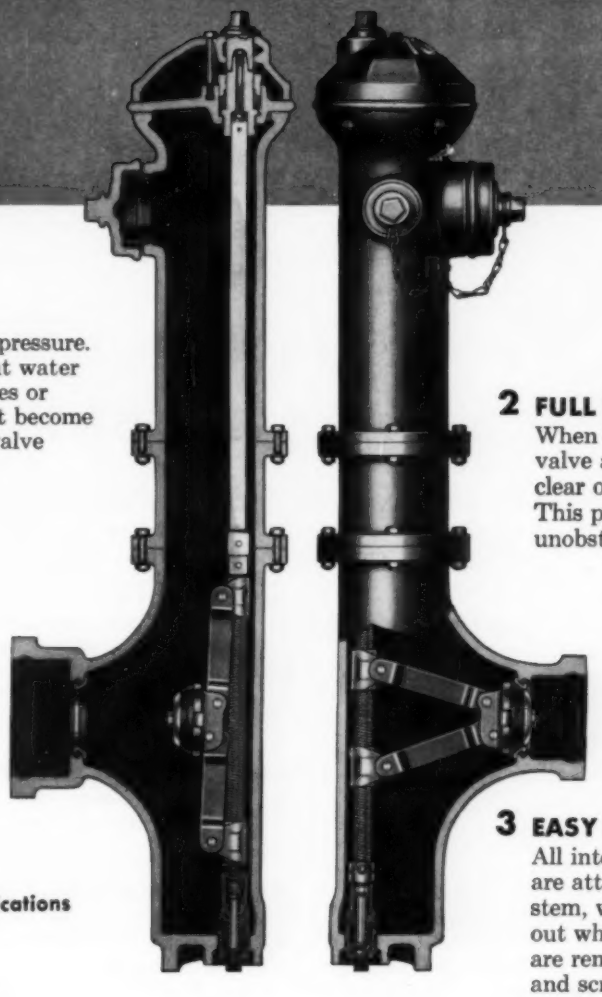
It's practically indestructible! "K&M" Asbestos-Cement Pressure Pipe is non-tuberculating, non-electrolytic, and corrosion-resistant. Its first cost is often the last cost. Pressure remains normal—pumping costs stay low.

Write today for more information.

K·M
BEST IN ASBESTOS

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

Here is why farsighted city officials install IOWA fire hydrants



1 FAST WATER
Opens fast, with the pressure. Closes slowly, without water hammer. Sticks, stones or foreign matter cannot become lodged between the valve and valve seat.

2 FULL FLOW
When hydrant is fully opened, valve and stem are entirely clear of the waterway. This permits free and unobstructed flow of water.

OPEN

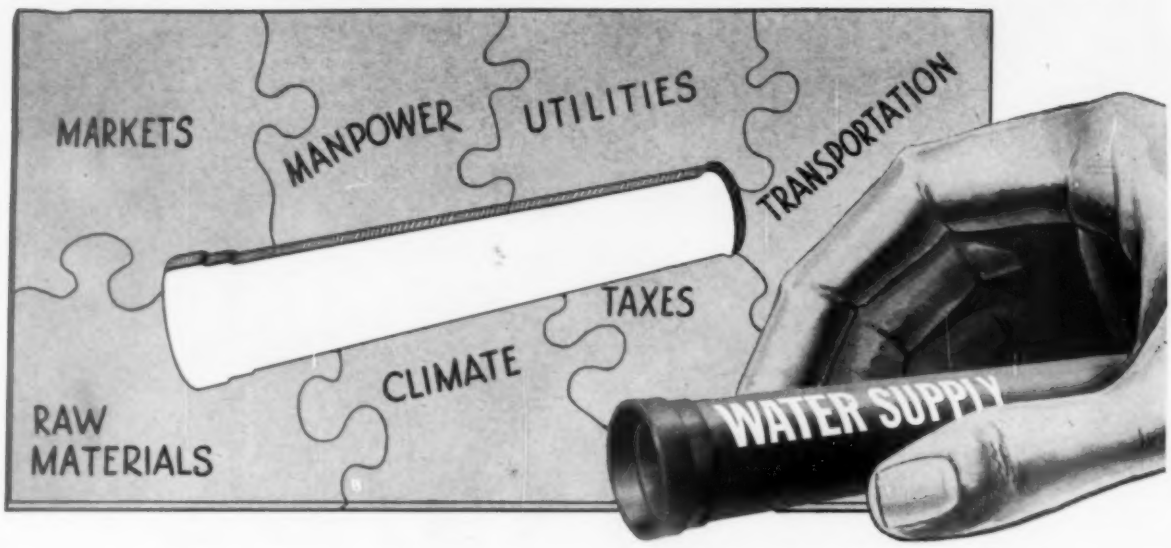
CLOSED

IOWA HYDRANTS AND VALVES
meet all A.W.W.A. specifications

3 EASY MAINTENANCE
All internal working parts are attached to the valve stem, which is easily lifted out when dome and head are removed. Common wrench and screwdriver only tools required. No special tools are needed.

Let us send you details on Iowa's complete line of valves and hydrants

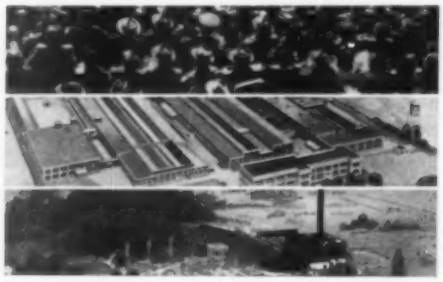
IOWA
VALVE COMPANY
A Subsidiary of James B. Clow & Sons, Inc.
Oskaloosa, Iowa



Foremost Factor in Community Progress an Adequate **WATER SUPPLY**

"The future pattern of regional growth and development will depend upon the wisdom and foresight of these many State and local areas in developing and allocating water resources for optimum benefit," says the U. S. Department of Commerce in its Bulletin, "Water Use in the United States, 1900-1975."

Projecting future water uses by major categories, this same authority estimates that:



POPULATION served by public water supplies will grow from 111 million in 1955 to 148.8 million in 1975, an increase of 34%.

INDUSTRIAL AND MISCELLANEOUS daily average water uses will grow from 60 billion gallons in 1955 to 115.4 billion gallons in 1975, an increase of 92.3%.

STEAM ELECTRIC POWER PLANTS using 59.8 billion gallons daily average in 1955 will use 131.0 billion gallons in 1975, an increase of 119%.

In summation, the total daily average of all these uses is estimated to grow from 262.04 billion gallons in 1955 to 453.08 billion gallons in 1975, an increase of 72.9%.

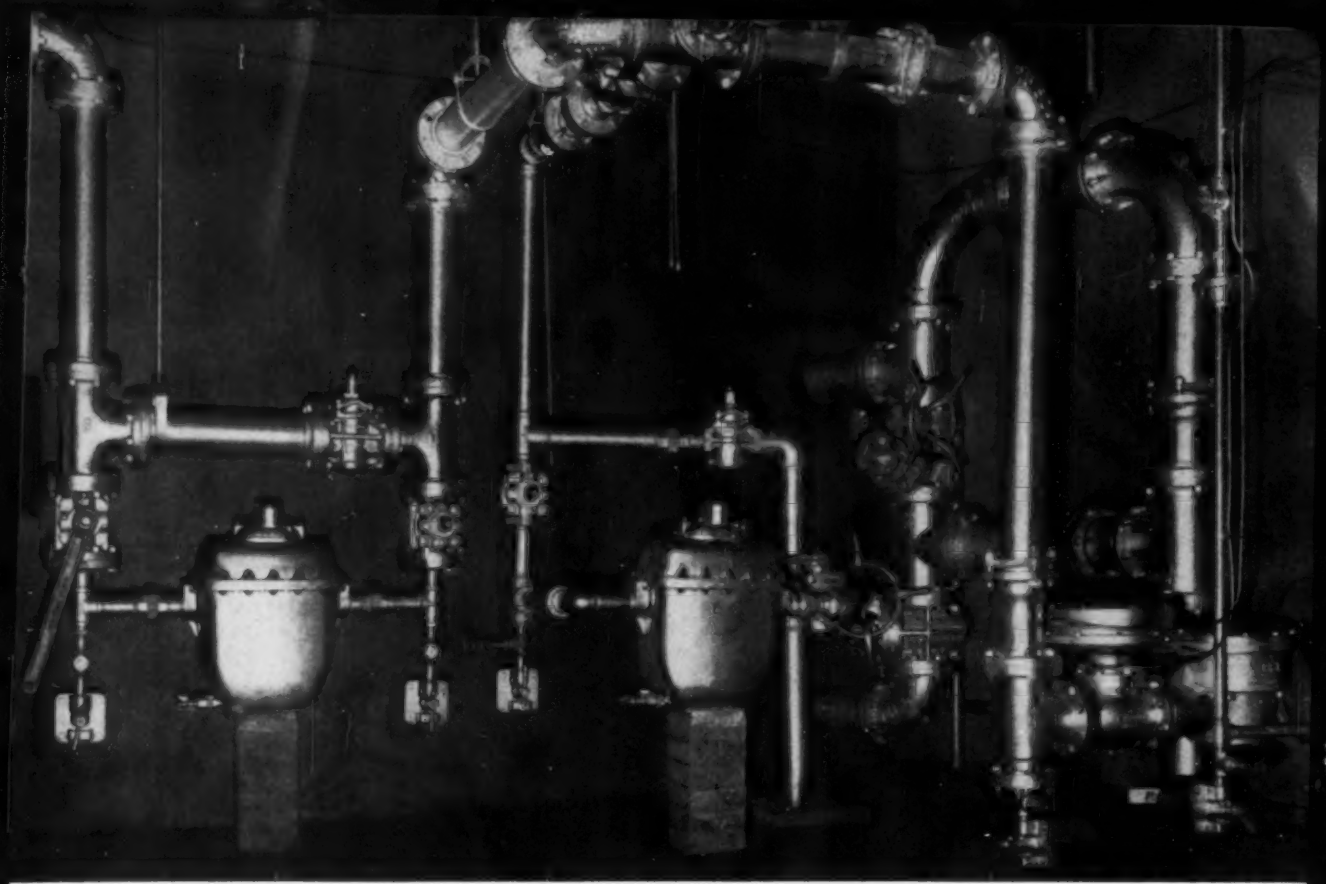
Many progressive communities throughout the U.S.A. are foresightedly expanding their waterworks systems in anticipation of largely increased water use. In the overwhelming majority of these cities, the pipe used for water system extensions is:

***Permanent* CAST IRON PIPE** *"America's No. 1 Tax Saver"*

— because informed officials know it will give the greatest return in terms of century-long, trouble-free service and efficient operation under *all* conditions.

Our Company does not manufacture pipe but has long supplied the nation's leading cast iron pipe manufacturers with quality iron from which quality Cast Iron Pipe is made.

WOODWARD IRON COMPANY
Since 1882
WOODWARD, ALABAMA



WHAT'S THE BEST VALVE FOR SEWAGE GAS?

ROCKWELL-NORDSTROM LUBRICATED PLUG VALVES resist corrosive attack better, seal tighter and stay in service longer than any other valve you can use on sewage gas. Here's why:

Rockwell-Nordstrom lubricated valves are sealed by a tough, instantly replaceable "seat" of pressurized lubricant. The lubricant film not only protects the plug and body, but eliminates metal-to-metal wear for longer life, lower cost. And lubricant sealing with the tapered plug and Sealdport system means that seating surfaces are unexposed to corrosive attack.

The same benefits of better performance, longer life and lower cost assured by Rockwell-Nordstrom valves on sewage gas service apply to any valve in the sewage plant.

Rockwell-Nordstrom valves are available in a complete range of sizes and pressures with a wide range of operating accessories. They cost no more to buy, often less, than ordinary valves. See your supplier soon or write for the free booklet, C-5200. Rockwell Manufacturing Company, Pittsburgh 8, Pa.
Canadian Valve Licensee: Peacock Brothers Limited.

ROCKWELL-Nordstrom VALVES
it's ROCKWELL
MANUFACTURING COMPANY

Rockwell Manufacturing Co.
Pittsburgh 8, Pennsylvania

☐ Please send me Bulletin C-5200.
☐ Please have your sales engineer call.

Name_____ Title_____

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City_____ Zone_____ State_____

Want cobwebs on your complaint phone?

Then use Calgon* — for Calgon stops red water and lime scale — the two main causes of customer complaints. Yes, you can turn complaints into compliments, because whether the "red water" comes from iron present at the source, or iron dissolved from the pipes by corrosion, Calgon treatment is the answer.

When well waters containing iron and manganese are treated with a few parts per million of Calgon, the iron and manganese are kept in solution and the water is as clear at the consumer's tap as it was when pumped from the well.

When red water is caused by iron dissolved from the pipes, it can be prevented with Calgon† treatment because Calgon forms a protective film on metal surfaces. Moreover, this protective film also reduces costly tuberculation damage, flows are kept high and pumping costs are reduced. Calgon treatment is particularly effective after water main cleaning since the protective film forms quickly and tuberculation never gets a chance to start.

A report of a twenty-four month study on the efficiency of Calgon in maintaining pipeline flows is available. Ask for a reprint of this paper.

Write or phone for more information. An experienced Calgon engineer will be glad to make detailed recommendations on your specific problem.

* Calgon is the Registered Trade Mark of the Calgon Company for its glassy phosphate (sodium hexametaphosphate) products.

† Fully licensed for use under U.S. Patents 2,337,856, 2,304,850 and 2,358,222.

CALGON COMPANY

DIVISION OF **HAGAN** CHEMICALS & CONTROLS, INC.
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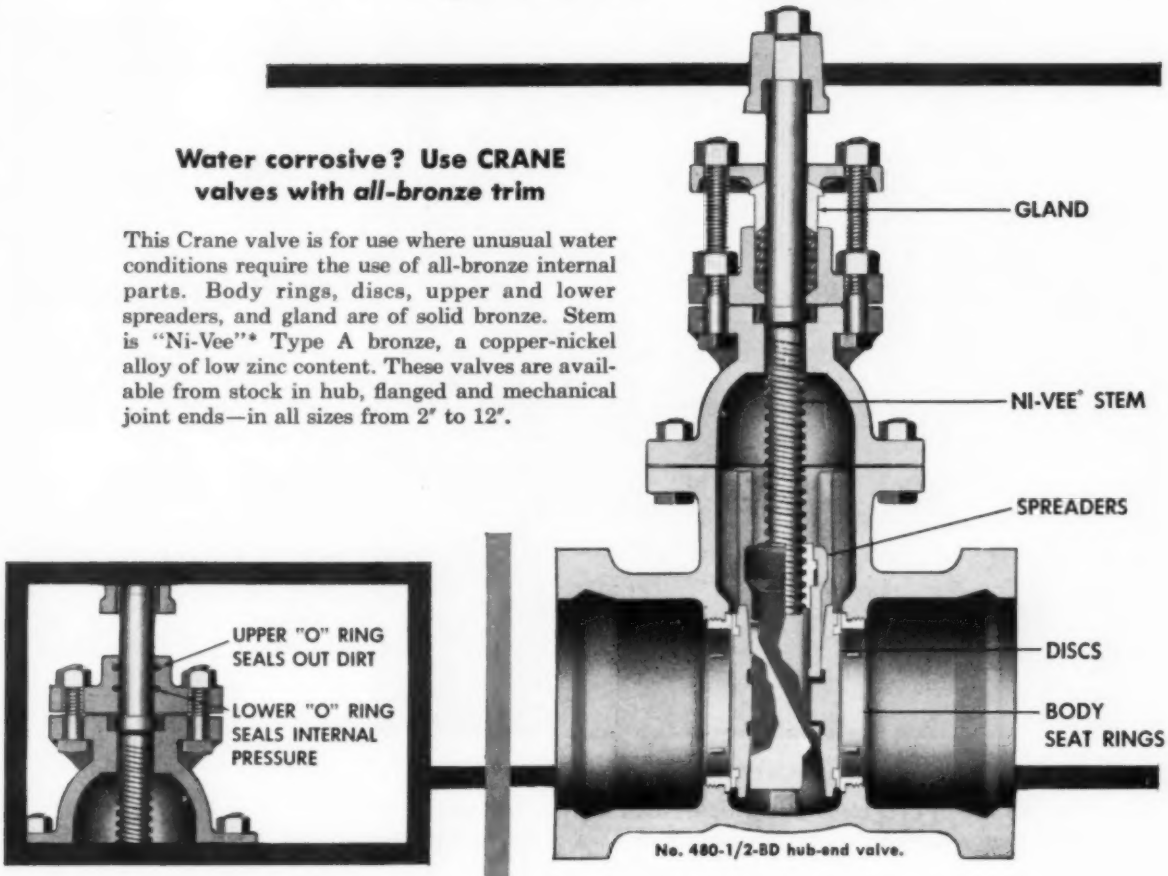
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

CRANE expands A.W.W.A. line for special needs

Water corrosive? Use CRANE valves with *all-bronze* trim

This Crane valve is for use where unusual water conditions require the use of all-bronze internal parts. Body rings, discs, upper and lower spreaders, and gland are of solid bronze. Stem is "Ni-Vee"* Type A bronze, a copper-nickel alloy of low zinc content. These valves are available from stock in hub, flanged and mechanical joint ends—in all sizes from 2″ to 12″.



No. 480-1/2-BD hub-end valve.

Double "O" ring stuffing box now available

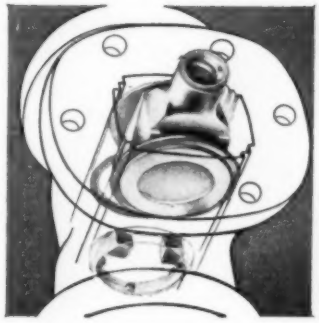
Another feature now available in Crane A.W.W.A. non-rising stem valves is an "O" ring stuffing box. Two Buna-N "O" ring seals hug the stem tightly. Lower ring acts to seal the internal pressure; upper ring is an external dirt seal and reserve pressure seal. Valves with "O" ring stuffing boxes are available with hub, flanged, mechanical joint ends—in all sizes from 2″ to 12″.

*"Ni-Vee" is the registered trade-mark of International Nickel Co.

Features of CRANE A.W.W.A. Valves justify their choice

Simple, 4-part double-disc assembly—2 discs, 2 spreaders. Discs are free to rotate—minimizing concentrated seat wear. Discs cannot fall out or jam. Easy opening and tight closing assured. Valves have much longer service life.

For complete details on these valves, write for circular AD-2108.



CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

THIS OPEN DOOR GUARDS YOUR MOST VITAL SERVICE

Water is your community's life blood. Water meters are universally accepted as the fairest way to charge for water . . . and the only way to keep people from wasting water.

But water meters, being fine instruments, naturally lose accuracy after years of wear. They start to give away revenue. They permit leaks and carelessness to creep back, and pumping costs go up. Eventually the water system cannot cope with the growing demand.

Worse yet, lack of proper income makes people hesitant to act, and water shortages may soon become critical.

How guard against this? Pick meters that stay accurate longer. Set up a good testing and repair program.

Walk into your meter repair shop. Talk to the men whose efforts guard your water supply. Ask them which meter gives highest sustained revenue . . . with lowest repair and depreciation costs. We sincerely believe the answer will be "Trident."

376

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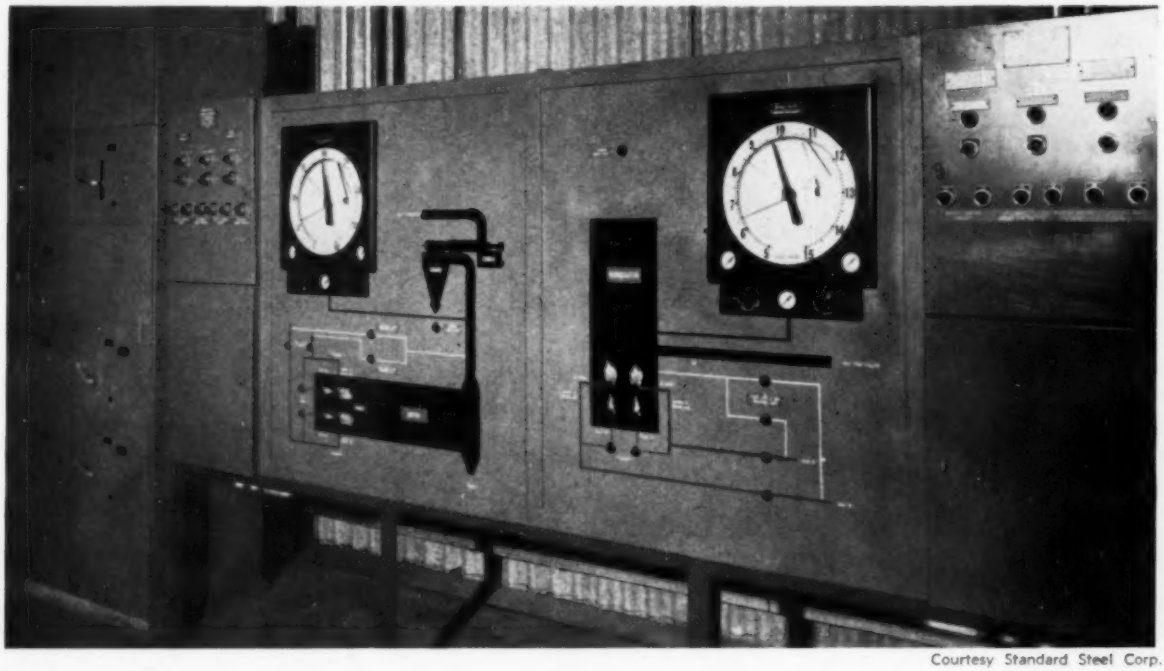
WATER & SEWAGE WORKS



Courtesy Standard Steel Corp.

INSTRUMENTATION for controlling burners in rotary sludge dryers and incinerator, at Broadway sewage works in Corpus Christi, Tex., typifies trends exhibited in the disposal of . . .

Sewage and Industrial Wastes *in 1957*

KENNETH S. WATSON,* Consultant, Water Management and Waste Control, General Electric Co., Schenectady, and President of the Federation of Sewage & Industrial Wastes Associations reviews the accomplishments of the field in the past year and presents some challenges for the future.

■ IN THE FIELD of waste treatment and stream pollution control, perhaps the year 1957 posed more questions than it provided answers. This is good if the questions can be recognized and the efforts of the future tailored to a resourceful solution of these problems.

Nothing can be done now to make 1957 more productive. The progress of the past year should be reviewed in retrospect, however, in the interest of evaluating accomplishments and establishing some guide-lines for improving future performance. Developments in 1957 must be appraised in broad perspective. In order to be truly objective, the many facets of activity must be viewed in relation to the needs and requirements in each area.

The problems of the field continue to grow more complex as the population expands and the nation becomes more highly industrialized, and emphasize the conclusion that in the arrival at the soundest solution to a treatment problem the approach must always be

* Mr. Watson is also a Contributing Editor of *Industrial Wastes*.

Courtesy Chicago Pump Co.

TEXTILE AND DAIRY WASTES are treated with domestic sewage in this activated sludge plant (1.385 mgd) at Lexington, N. C. The industrial wastes account for approximately $\frac{2}{3}$ of the load.

tempered by the economics of the situation. Higher interest rates probably made it more difficult for some municipalities to proceed with the provision of sewage treatment than has recently been the case.

The activities of the year make it abundantly clearer that water supply and waste control are closely related. As the water demands go up, the need to preserve and protect the surface streams—the nation's major source of supply—increases accordingly. Additional requirements for water also stimulated efforts to make another use of the treated effluents from industry and municipality.

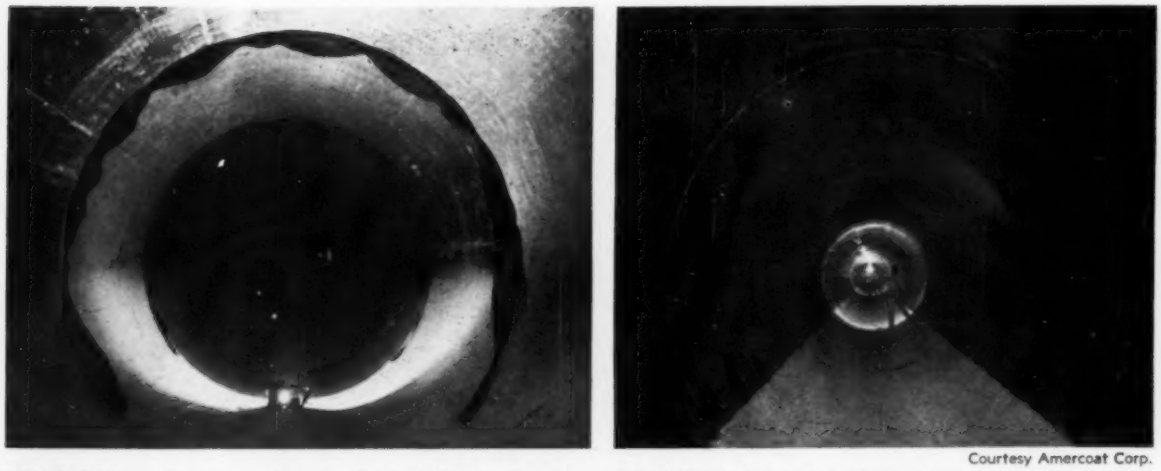
In an article of this type it is obviously not possible to cover everything which happened in 1957. Since this is true, an effort will be made here to cover the innovations of consequence. Further, construction projects and operations typical of many will be reported in the interest of recording significant trends.

Recruitment

A major question existed at the beginning of 1957 and it is still very much present to plague the thinking people in the field. What is to be the source in adequate numbers of competent and qualified personnel, with the potential of upgrading the field, to man the rapidly expanding assignments of the future? Youngsters, in insufficient numbers, are at present enrolling in engineering schools to provide adequately for the nation's future engineering needs. Our problem is further complicated by the fact that the waste control field is not attracting the proportion of these engineers that should reasonably be expected.

It would appear that everyone in the field must become concerned with the fact that too few young technical men are being drawn to it. A much better public relation job must be done. The sanitary engineering college must explore the approaches by which they can more nearly fill their

SEWAGE TREATMENT at Columbus, Ohio, employs activated sludge in this modern plant.



Courtesy Amercoat Corp.

SEWER TUNNEL, in Orange County, Calif., 9½ ft in diameter, utilized T-lock lining. Left photo shows flaps not yet stuck down, right, is the completed section of poured tunnel.

classes. Industry must insist that the chemical engineering schools give more thought in the preparation of their curriculums to enrolling and training engineers for this field.

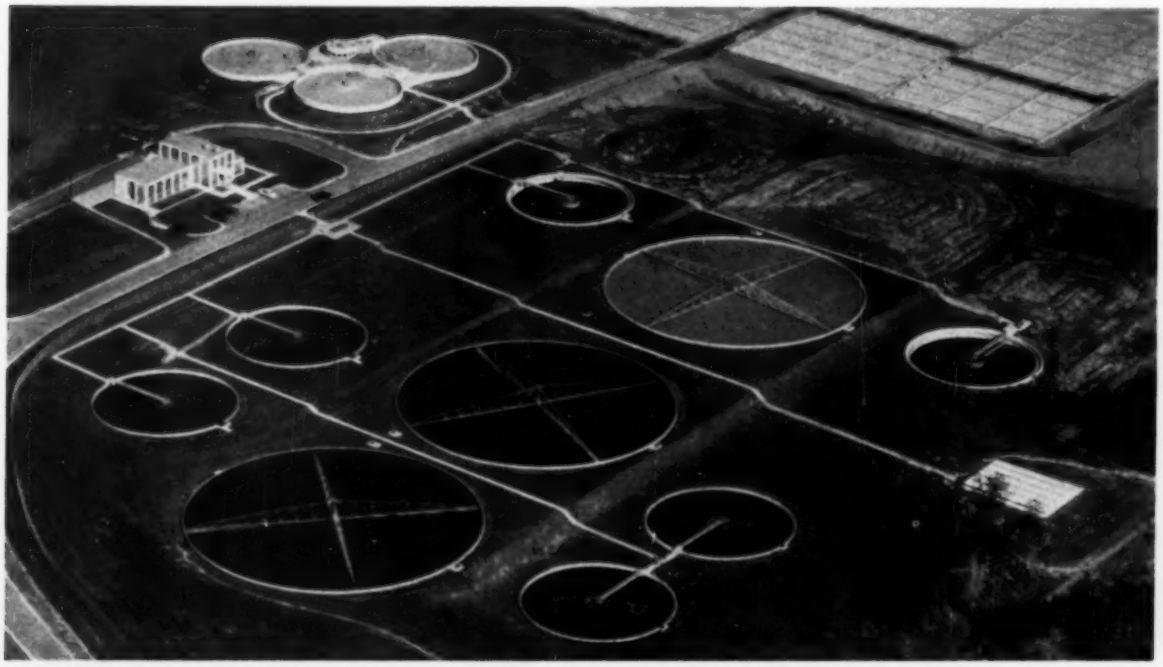
The National Research Council, and the Joint Committee on the Advancement of Sanitary Engineering, have held meetings and given some thought to this problem. The Public Health Service is making a contribution by providing fellowships for advanced study. These efforts represent a good beginning, but a bigger effort on a broader base must be launched.

Legislation

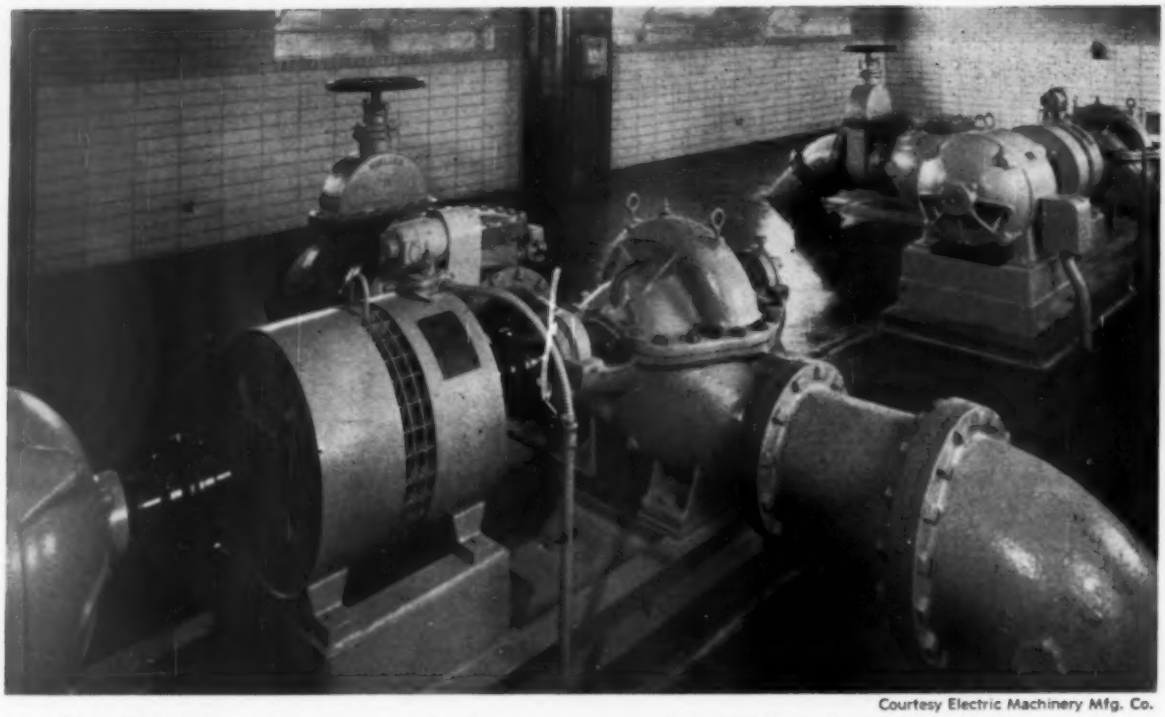
Since public law 660 became effective on July 1, 1956, it remained the stream pollution control law at federal level during 1957.

There was the usual large number of private interest stream pollution control bills presented before state legislatures. Most of these were too narrow in scope to be passed by the legislative bodies. The trend in the states seemed to continue toward a central control board in which all the pollution control authority is centralized. There is also a trend toward the creation of state water resource commissions to be concerned with the availability of water and its sound use.

The five major interstate compacts continued to function in their respective basins and make contributions toward basin-wide pollution control. Investigations were underway in the Interstate Commission on the Potomac River Basin to expand its functions to cover the entire water resources



BIOFILTRATION plant at Raleigh, N. C., has a capacity of 12 mgd, and includes two Detritor tanks, three primary clarifiers, three "Biofilters," three final clarifiers, and three sludge digestion tanks.



Courtesy Electric Machinery Mfg. Co.

RAW SEWAGE at Odessa, Tex., is pumped by these pumps powered by Ampli-Speed units. Note Mueller gate valves on pump lines and Wallace & Tiernan residual chlorine recorder in rear.

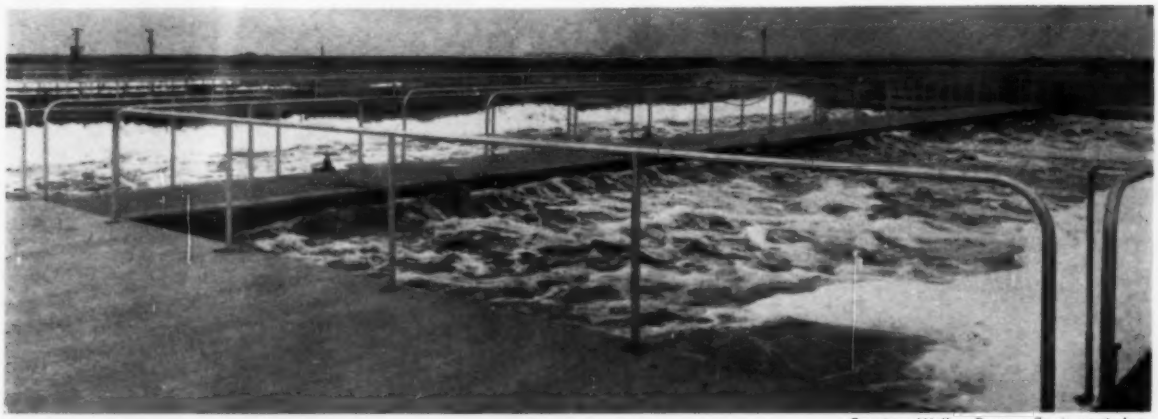
field. A new compact was up for ratification in the Great Lakes Basin. At year's end this compact had been adopted by at least five of the eight eligible states and will serve the states of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin.

Construction Grants

Since public law 660 went into effect, it is now possible to look at accomplishments during the first year of this program. A total of 446 projects were approved and offered federal grants. The estimated construction cost of the projects amounted to $166.8 million with the federal gov-

Courtesy Nichols Eng. & Res. Corp.

SLUDGE INCINERATION at Indianapolis, Ind., is accomplished in three multiple hearth furnaces; a fourth furnace is a combination dryer-incinerator.



Courtesy Walker Process Equipment, Inc.

AERATION TANKS at Odessa, Tex., activated sludge plant utilize "Diffusair Sparjers" as do holding and grease removal tanks.

ernment's share running $37.9 million. By July 1, 1957, four projects costing $241,867 had been completed and 141 projects with a cost of $54 million were under construction.

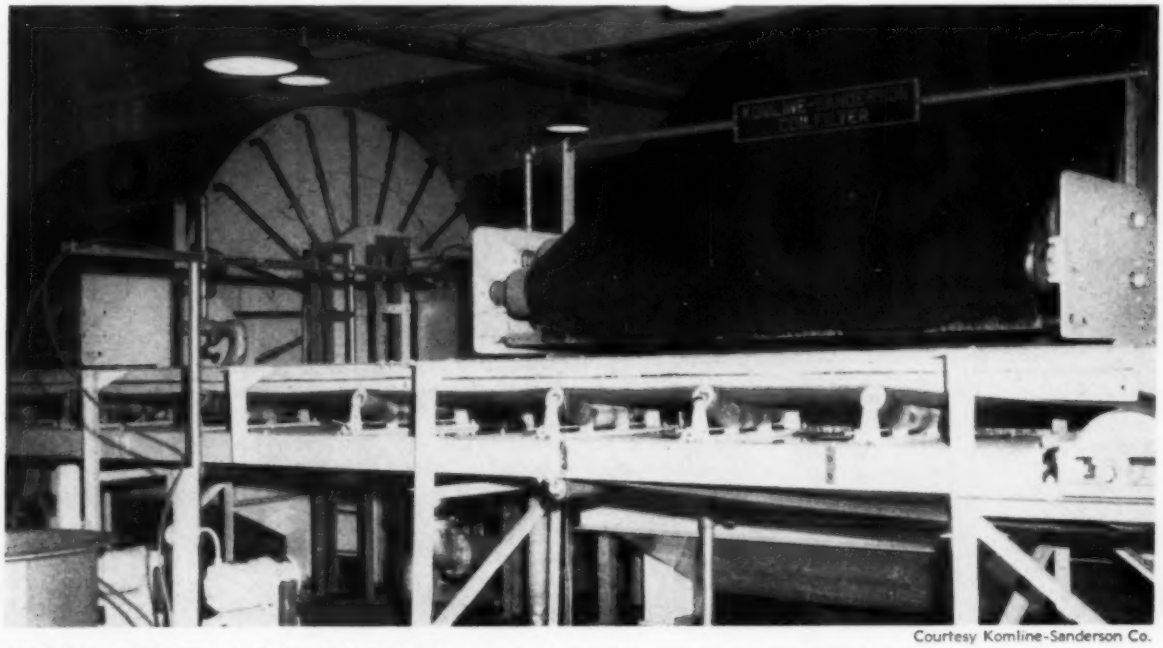
The state sanitary engineers seem, for the most part, to be for the program.[1] Most municipalities also seem to be favorably inclined. When the first 31 weeks of 1956 were compared with the same period in 1957 it appears that construction was ahead in 1957 by almost $65 million. This conclusion was reached after subtracting the $80 million Allegheny County Sanitary Authority project from the 1956 totals.

Only $38 million of the $50 million appropriated for fiscal 1957 was committed because it took time to get the program machinery set up. Appropriations for fiscal 1958 were established by congress at the $45 million level. The uncommitted funds for 1957 will be held over and allocated in fiscal 1958 to swell the total grant money available to $62 million.

Sewage Works

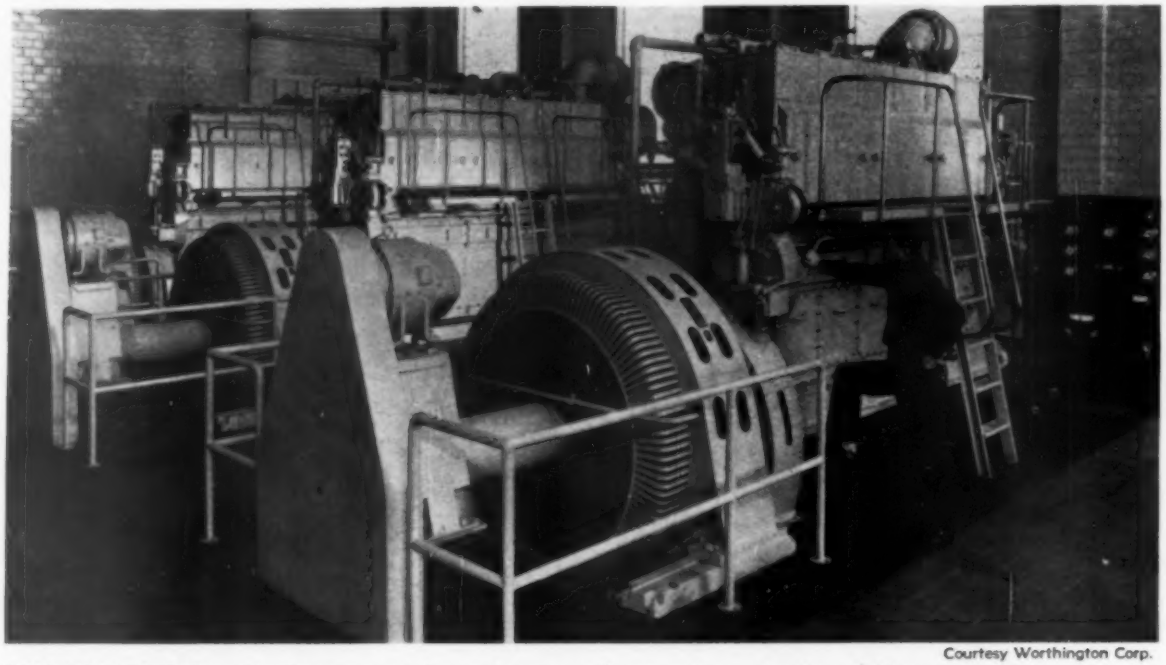
New facilities were placed in operation or under construction at many places. Sloan[2] indicated that the new $27 million high-rate, activated sludge plant in Miami, Fla. is now in operation. This is a 47 mgd plant with the outfall extending 4,600 ft into the Atlantic Ocean. General obligation bonds in the amount of $16,000,000 and revenue bonds amounting to $11,000,000 were issued to finance this project.

According to Cosgrove[3] the 343 mgd Deer Island plant, which is part of a $65 million construction program for the greater Boston area, was placed under construction. About 1.5 million people in 37 cities and towns



Courtesy Komline-Sanderson Co.

VACUUM FILTRATION of sludge is included in sewage treatment process at new plant in Erie, Penna.



Courtesy Worthington Corp.

DUAL FUEL ENGINES, with direct-connected generators, supply power for east and west side sewage treatment plants in Jersey City, N. J.

will be served by these facilities. Two deep rock tunnels, both crossing Boston Harbor, are being constructed as a part of this system. The plant is of the primary type with sludge digestion.

Improvements were also being made in the area of the nation's capital. The operation of a new $8.2 million plant in Alexandria, Va. was reported.[4] The architecture is colonial in style to be consistent with that of the area. The plant will handle 18 mgd of sewage, its operating cost is estimated at $250,000 per year.

An interesting innovation in beautifying a sewage treatment plant took place at Coral Gables in 1956 but was reported this year.[5] The plant is located adjacent to the campus of the University of Miami and contains classrooms and laboratory facilities for instruction purposes. As a result of the campus setting and the desire of Florida engineers to keep that state beautiful, artist John St. John was commissioned to do murals on the walls of the digester tanks and digester control buildings. The murals depict the approximately 450 years of Florida's history. The plant serves 25,000 people and had a cost of $3.2 million. This would appear to be an example of the type of imagination necessary to improve public relations in the sewage treatment field.

The beginning of construction in 1956 of the Louisville sewage treatment plant was reported by Spiker.[6] The $6 million primary treatment plant will handle 100 mgd of sewage. The interceptor system will cost $10.2 million. A $46 million garbage and trash incinerator will be combined with the treatment plant.

Progress was also being made in the area of the nation's largest city. New York City launched the $85 million Newton Creek pollution control job.[7] The first step will be the building of the Morgan Avenue intercepting sewer at cost of $9 million. The plant will be the city's largest with a capacity of 310 mgd.

Meanwhile, across the bay, Jersey City was placing its new $38 million treatment facilities into operation. The system contains two plants with interlocking sludge handling and disposal facilities. One plant will handle 36 mgd and the other 46.6 mgd.

Innovations kept cropping up as one would expect in a dynamic field. The hyperion outfall, 36,772 ft in length, was launched. The line was literally pulled off the beach in 1,200 ft sections. This line terminating in a canyon 300 ft below the surface was maneuvered fully into place in the remarkably short period of 7½ around-the-clock days.

A private sewer company, according to Wade[8] came to the rescue of a subdivision abutting Jackson, Miss. when the city refused to supply water if this area built a treatment plant above the water intake. The areawide sewer system now connects into the city system.

Brown and Caldwell[9] reported upon two new techniques for the detection of leaks in defective sewers. The use of a stereoscopic camera transported on a sled and the application of air under pressure are the two methods. After the equipment is available, photography will cost approximately 0.35c per foot and air pressure 0.25c per foot.

Carlson and Cornell[10] reported success in controlling scum formation and grease problems in a digester by the use of enzymes. The digester was handling 4,500 lb per week of directly charged ground garbage in addition to the sludge from Genoa. The Sea-Cal Formula M-200 ultimately eliminated 4 feet of scum, sealed the digester cover from leaking, and increased gas production.

Lagoons or stabilization ponds were more and more extensively used in the treatment of sewage. Repre-

sentatives of the Robert A. Taft Center[11] reported work with Texas and Ohio to determine application of this approach in those states. They conclude that raw sewage stabilization ponds have proved to be a practical, minimum cost method of raw sewage treatment in the northern plains region of the United States.

Robert C. Merz, et al[12] report success with the use of a primary lagoon at Majave, Calif. With a loading of up to 100 lb of B.O.D. per acre per day average B.O.D. removals of 60 per cent and soluble B.O.D. removals of 85 per cent were accomplished.

Waterville, Wash. also uses the lagoon approach and finds it an economical and cheaply maintained sewage treatment system.[13] Since pioneering the lagoon approach in the Northwest four other communities in the immediate vicinity have constructed lagoons.

The Regional Approach

The most notable example of the regional approach to the collection and treatment of sewage and industrial wastes is that of the Allegheny County Sanitary Authority. 1957 was the second year of construction for this $80 million project scheduled for completion in 1959. About 68 municipalities and some 20 industries are participating directly in this project. When the number of industries already connected to the municipal systems which are now part of the Authority are combined with those connected directly, a total of over 100 results.

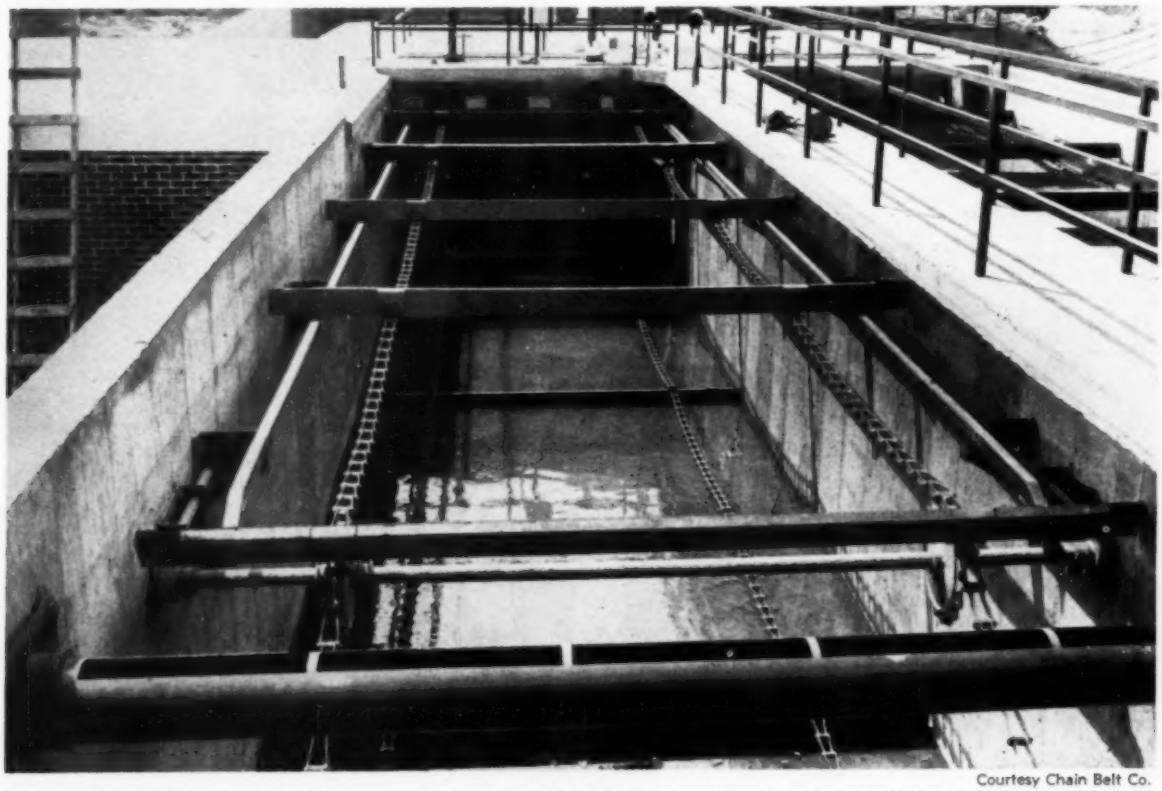
About 64 miles of new intercepting sewers are being provided to get the sewage of the area to the treatment plant. The plant will have a capacity of 150 mgd. This is a pioneering project since never before have so many individual municipalities and industries combined forces in the provision of waste treatment.

The Williamsport Sanitary Authority is building two new plants to take care of the city and its industries.[14] The major industry to be connected into the system is a tannery. The central plant of 5.2 mgd capacity will also serve South Williamsport and Loyalsack Township. The operating costs for the central plant are estimated at $50,600 per year.

Wilmington, Del. and adjoining New Castle County are moving toward a common treatment plant according to Calahan.[15] All sewers outside the city will be built, owned, and operated by the county. A gaging station will be installed wherever a county sewer connects into the city system. The county will collect from persons served and pay the city. If the county had proceeded alone, four plants would have been required with expansion capacity in each. Secondary treatment would also have been necessary for county plants whereas primary will be adequate for the common plant.

Combined Treatment

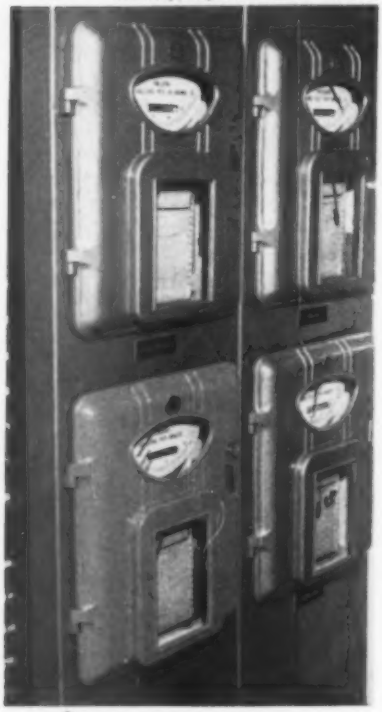
The past year saw more and more municipalities and industries realize that the treatment of the combined wastes of an area in a common plant represents in many cases the soundest approach. Byrd and Gex[16] in making a plea for this method pointed out that a municipality has an obligation to treat all wastes for which this action represents the most economical approach. The municipality must establish a fair system of charges and



Courtesy Chain Belt Co.

SLUDGE COLLECTOR flights in primary settling tank at Watseka, Ill., also move skimmings to "Roto-Skim" scum collector.

Courtesy Simplex Valve & Meter Co.



METER PANEL in Village Creek Plant at Birmingham, Ala., plant.

Courtesy Yeomans Bros.

AT THE CLAREMORE CONCESSION of Phillips Petroleum Co. on the Will Rogers Turnpike, in Oklahoma, on activated sludge plant solved the sewage disposal problem.

MIXER-STABILIZER unit of "Biosorption" activated sludge plant at Lisle, Ill., sludge digester in background.

Courtesy Infilco, Inc.

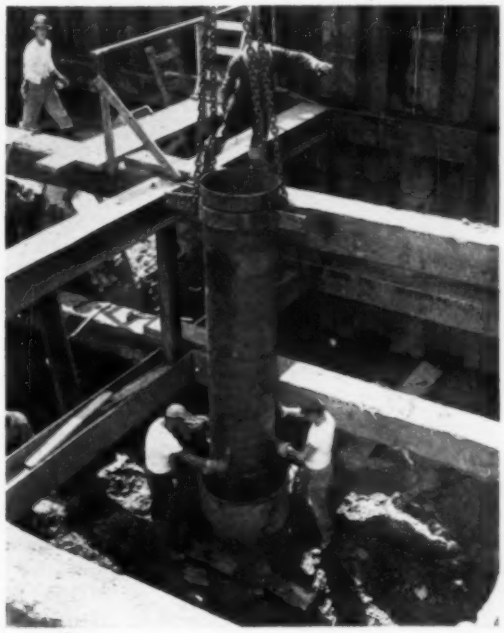
Courtesy Stuart Corp.

GRIT REMOVAL from aerated grit chambers is accomplished by tubular conveyor system at the Jefferson County Sewage Works (Birmingham, Ala.).

Courtesy Washington Aluminum Co.

MAINTENANCE-FREE aluminum manhole gratings and frames were used to advantage in Southbridge, Mass., sewage treatment plant.

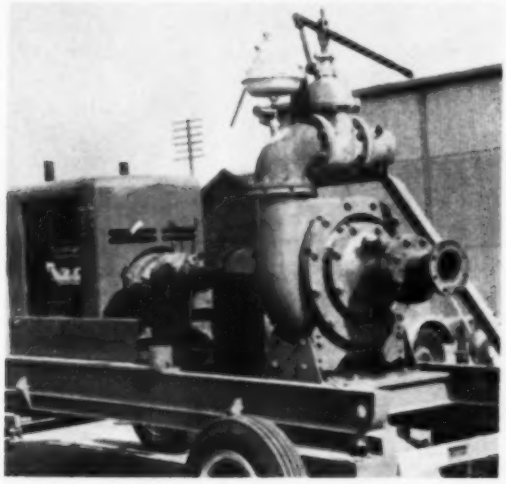
Courtesy A. M. Byers Co.



WORKMEN guide section of a large wrought iron down shaft into place during construction operations on the $80,000,000 pollution control project of the Allegheny County Sanitary Authority in Pittsburgh.

PORTABLE Torque-Flow Pump is utilized in the Los Angeles area for digester tank cleanout and emergency sewer service work.

Courtesy Western Machinery Co.

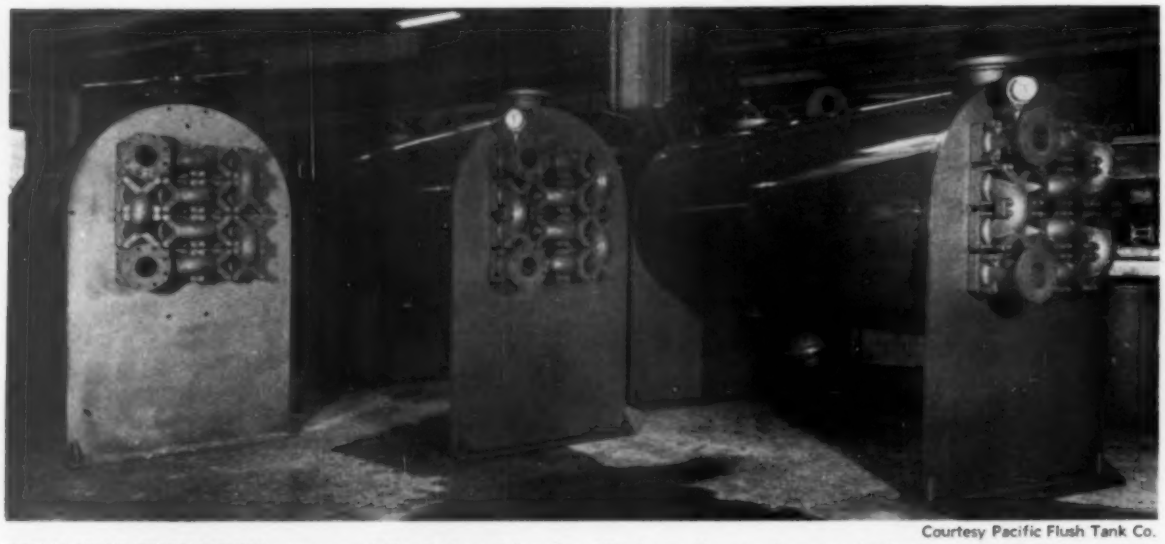


AT OXNARD, Calif., the new 6 mgd sewage treatment plant includes a "Currie Claractor" and "Multdigestion" system in a compact arrangement.

Courtesy Dorr-Oliver, Inc.

Courtesy American Vitrified Prod. Co.

VITRIFIED CLAY pipe being installed for domestic sewer line. Note safety conscious workmen with hard hats.



Courtesy Pacific Flush Tank Co.

STEAM HEAT EXCHANGERS were specially designed for the Allegheny County Sewage Authority for use with special Laboon process. These drum and tube heat exchangers shown in the shop are three of five units.

both parties should have a cordial spirit of cooperation. Industry, on the other hand, must reduce or eliminate those contaminants where it can do so more economically. Industry must also be willing to pay a fair share of the combined treatment costs.

In March, the American Cyanamid Company broke ground for a new 4.5 million gallon secondary sewage treatment plant on a 57 acre site adjacent to the Bound Brook Works. This plant is being built after four years and $750,000 were spent in research and development to demonstrate that these particular industrial wastes would respond to the activated sludge process.

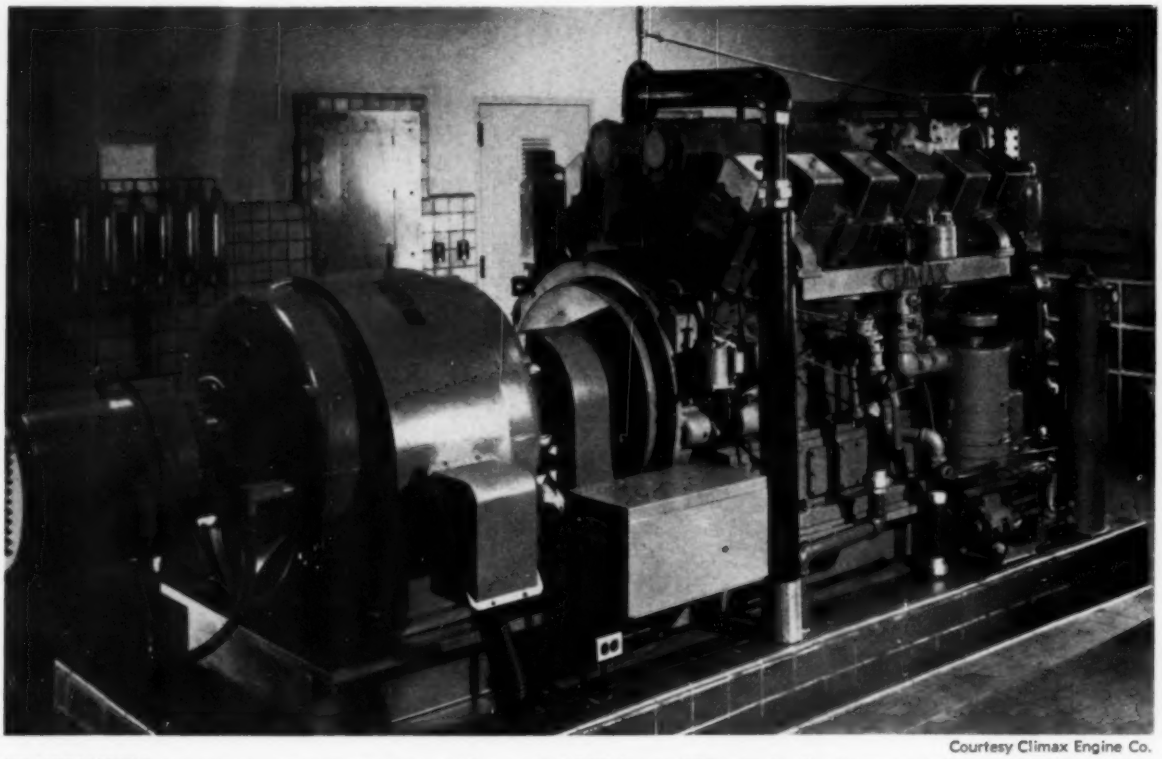
A significant development with reference to this plant is the fact that the Somerset-Raritan Authority started construction somewhat later on a primary $2.8 million plant on a plot of ground adjacent to the Cyanamid plant. The Authority and the Company have signed an agreement for the Company to provide secondary treatment for the Authority's sewage.

A section of the city sewer system at Dearborn failed. An investigation indicated that acid from the Sharon Steel Plant was responsible.[17] A study was made extending over a year to determine the magnitude of the problem. In this survey four automatic pH meters, a volume flow meter, and a temperature recorder were used. During this period, numerous tests at the treatment plant laboratory showed that pickle liquor could be used for sludge conditioning. As a result, a contract has been signed between city and company for delivery of 11,000 gal per day (the steel plant's output) of spent pickle liquor to the treatment plant. The company purchased a new 3,000 gallon tank trailer and is responsible for delivering the acid. Meanwhile, a city suit against the industry has been dropped. Mr. Michael A. Groen, Superintendent of Sewage Treatment, received the American Public Works Association's Charles Walter Nichols Award for this combined approach solution.

The 12,000,000 gpd sewage treatment plant at Raleigh, N. C., will take the wastes from two textile mills, an electric meter manufacturing plant, laundries, and commercial establishments.[18] Most of the wastes do not at present enter the plant, but they will when the sewer system and pump stations are completed. Westinghouse is at present operating a $75,000 pretreatment plant for 183,000 gpd of

Courtesy Builders-Providence, Inc.

IN BLOWER BUILDING of Miami, Fla., sewage treatment plant, control panel records aeration air volume, air temperature (wet and dry bulb), digester gas burned by engines and indicates air to sewage ratio. At right are ratio unit transmitter, log unit, and air summator.



Courtesy Climax Engine Co.

COMBINATION sewage gas—propane gas engine, rated 257 hp at 900 rpm is direct connected to a 219 kva, 175 kw, 400 volt AC generator at the Northside sewage treatment plant, Durham, N. C.

wastes ultimately to be discharged into the city sewer. Industrial plants will ultimately be asked to comply with tentative regulations in the proposed sewer use ordinance. This approach is specifically mentioned because it can have proper application in so many instances.

Modesto, California[19] (18,000 people) reported that the waste problems of even a small municipality can be solved in a common plant. This community is also evaluating whether it should take a neighboring town into the system. A pilot plant unit is also being operated to demonstrate what additional treatment should be given to the combined effluent.

Kittrell[20] in a summary article pointed out again the fact that metal finishing wastes should be controlled when being discharged into a municipal sewer system. He states that sufficient information on the toxic character of these types of wastes is not often available to establish absolute limits in a sewer ordinance. Serious consideration should be given to advanced research on any particular problem to provide quantitative design data.

Industrial Wastes

Activity in industrial wastes control continues to bear out the fact that this is an important area in the pollution control field. A review of the articles published indicates that much thought is being given, as it should be, to the nuclear wastes field. The number of private industry atomic energy installations proposed continued to grow. As private industry begins to operate atomic energy installations the trend should be toward nuclear wastes becoming another typical industrial waste to be handled accordingly.

A significant pilot plant installation was operated for most of the year at Niles, Ohio. This is an effort sponsored by seven steel corporations to solve the always difficult pickle liquor problem. The Blaw-Knox Ruthner process is being used in this project and the installation had a cost of about a half million dollars. This process yields sulfuric acid and iron oxide, both of which can be charged back into the process at a steel mill. The final conclusions on this work are not yet available but the steel industry hopes it will unlock the door on one of industry's most stubborn disposal problems.

Pirk[21] in discussing activities at the Rome Cable Co. stressed an important consideration in the industrial waste control field. This is the procedure of recirculating water as a cost reduction and waste control step. By installing a clarifier the plant is now reusing and thus saving 600,000 gallons of water per day. The clarifier also recovers 100,000 lb per year of copper and keeps it out of the plant effluent.

McKee[22] in an article again stresses the fact that spray irrigation is a satisfactory method of waste disposal for dairy and other specific wastes. The application rates for dairy wastes ranges between 2,500 and 10,000 gallons per acre per day. Under normal and proper application conditions there is no runoff or odor problem.

Pearman and Burns[23] reported upon the first year of operation of the $2 million, nutrient-fed, activated sludge disposal plant at the West Virginia Pulp and Paper Co. operation at Covington, Va. The monthly operating costs run $8,045 plus $11,890 for depreciation. The plant re-

COOPERATION between industry and municipalities was evidenced by arrangement between American Cyanamid Co. and three communities in New Jersey where the company constructed this $4,500,000 secondary sewage treatment plant. In the foreground, the walls of the administration and operation building; in the background the aeration tanks.

moves 75 to 80 per cent of the B.O.D. and 85 to 90 per cent of the suspended solids. The authors conclude that full confidence can be placed in this type of activated sludge process to successfully treat kraft and neutral sulfite mill wastes of the type discharged at Covington.

Langford[24] reported that the field could expect wastes from a new industry—the rocket propulsion industry. The wastes reported, however, appear similar in many respects to those from the metal finishing industry. Chromium and cyanides were two of the wastes given particular mention.

Lukas and Ottaway[25] indicated that the wastes from an industrial research laboratory can be handled by monitoring and survey of the effluent and equalization or dilution into the remainder of the plant discharge. Small quantities of chemicals which can not be discharged down drains are collected in metal containers and hauled away. The sanitary sewage from this General Electric Research Laboratory is treated in an Imhoff tank.

Reclamation

Enough articles were written during the year to demonstrate that alert people in the field are thinking more comprehensively in terms of using the effluent of sewage treatment plants as a source of water supply.

Three articles from California show that this approach is being given careful consideration in that state.[26, 27, 28] At the 1956 reclamation conference in California it was concluded that the reuse of sewage effluents is technically feasible, fully legal, and the district water and sewage machinery is not a deterrent. The other two articles are concerned with attempting to use treated sewage for industrial, recreational, and fresh water barrier purposes. The use of spreading basins and injection through recharge wells is proposed.

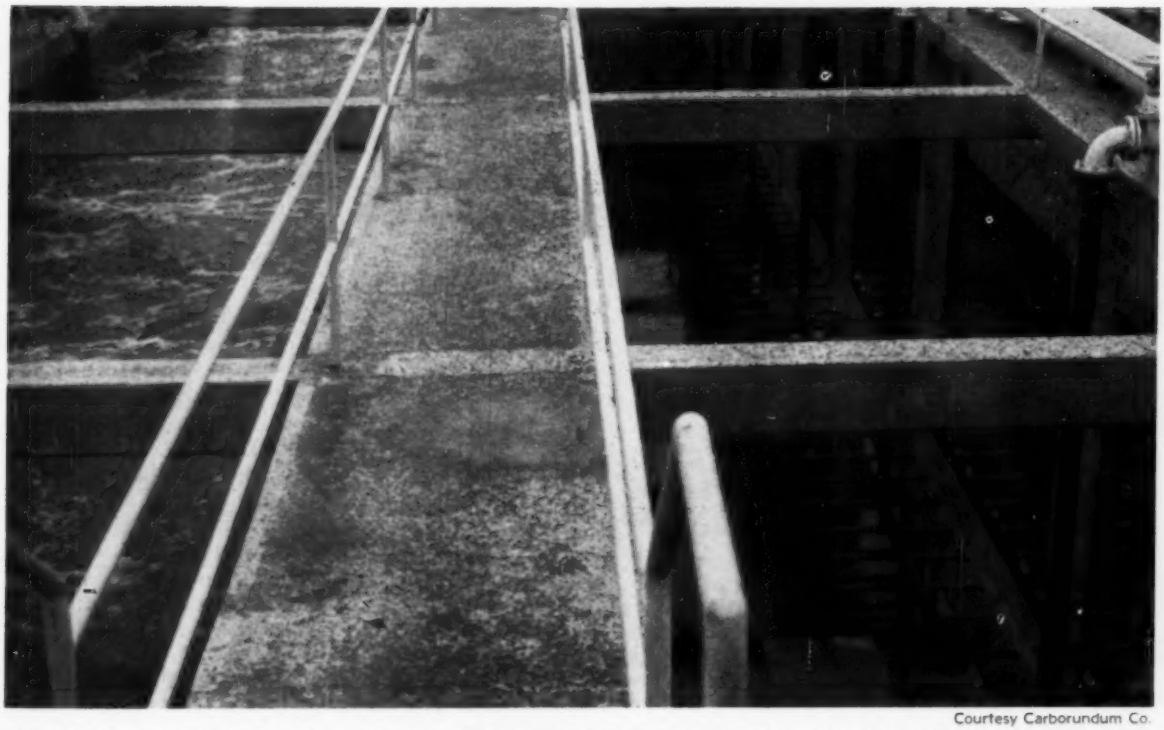
As might be expected, other articles on the reclamation of treated sanitary sewage effluents came from Texas. Connell[29] reported that industrial reuse of municipal waste water is only beginning in Texas. Direct re-use of process water within industrial plants is widely practiced. He also points out that indirect re-use of stream-carried industrial effluents is not prevalent because streams are few in number and dilution water is not great.

Allison[30] indicates that Corpus Christi has had the urge to deliver a "perfect" effluent for a number of years. The urge for this 3 mgd standard-rate filter plant to deliver a good effluent has its origin in a contract between the city and a refinery. The refinery uses this effluent as a source of industrial water. The average B.O.D. of the effluent is 6 ppm, while the D.O. runs 4.3 to 7.5 mg/L.

Research

Since research is a vital part of modern, industralized America, it is appropriate to consider research in the sanitary sewage and industrial wastes fields underway and reported. As is usually the case, very little information is available on the amount of research underway within industry itself.

Faber[31] reported that during 1956 under the National Institutes of Health Research Program $880,853 was granted for research in sanitary



Courtesy Carborundum Co.

PREAERATION unit at Topeka, Kan., utilizes Link-Belt aeration equipment and carborundum tube diffusers ahead of clarifiers.

engineering and occupational health. Of this amount, $202,339 was granted for research in the fields of sewage and industrial wastes. It is of interest to note that almost $40 million was granted in the total NIH research program. On this basis, sanitary engineering did not receive a very equitable portion of the total.

Hurwitz[32] indicated that dried activated sludge could be fed to pigs, poultry, steers, and sheep as a source of vitamin B_{12}. A ton of sludge contains amino acid valued at $12,000 and vitamin B_{12} worth $750. Quantities fed ranged between 1 and 10 per cent of the weight of the total ration. Weight gains were as a general rule normal. No pathological symptoms were evident in the test animals and there was some evidence of unknown growth factors in the sludge.

Pearson [33] et al found that five different biocatalytic additives used in sludge digestion had no significant beneficial effects on digestion or grease liquefaction.

Moss[34] reported on research on detergents being done at four universities. He concluded from this work that ABS does not effect bacterial life or efficiency of operation but it does produce frothing. There is little promise that a specific strain of bacteria can be found capable of completely degrading ABS. Conventional treatment does not completely eliminate detergent. This can more nearly be done by control. Questions on ABS have not yet been completely answered, so the projects should be continued.

Budd and Lombeth[35] in using high-purity oxygen in a pilot scale biological sewage treatment unit turned up some additional significant information. They conclude that by such use the secondary treatment area may be reduced as much as 50 per cent, secondary treatment volume requirements may be reduced by 30 per cent, and operating power requirements remain essentially the same.

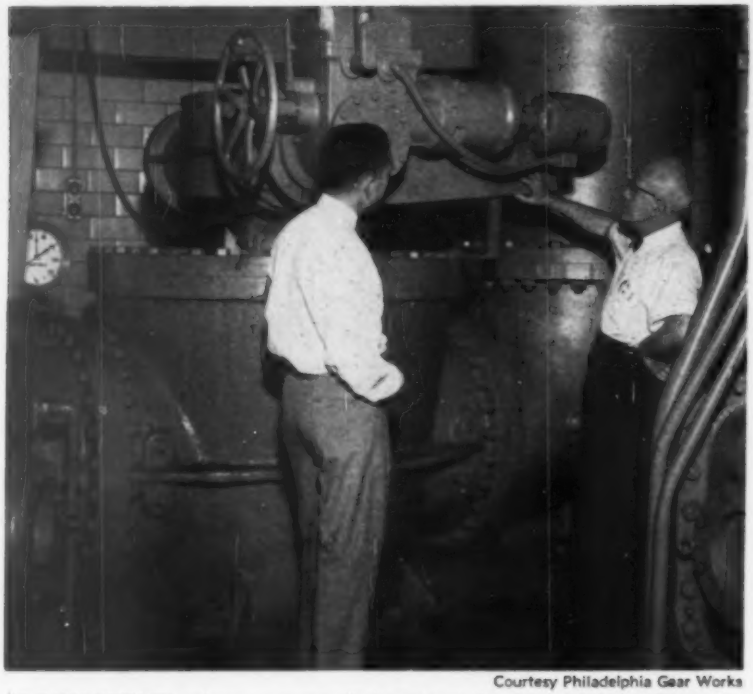
A report was made by workers at the Robert A. Taft Center on principles which could be used in a dissolved oxygen analyzer. If this basic approach could be developed into a rugged, automatic, economical instrument which could be installed in the field to record the dissolved oxygen content of streams and effluents this would be of tremendous significance.

Certification of Sanitary Engineers

The American Sanitary Engineering Intersociety Board, incorporated in 1955 and sponsored by ASCE, AIChE, ASEE, APHA, AWWA, and FSIWA really got rolling on its certification program in 1957. The deadline for receiving applications under the "grandfather" clause was set for October 1, 1957. The qualifications for application for certification without examination were: registration as a professional engineer, a minimum of 15 years of practice, and the achievement of a high standing in sanitary engineering

At a meeting of the Board of Trustees in July, about 300 persons were elected to membership in the American Academy of Sanitary Engineers. At another meeting of the Board on October 18, 1957 approximately 450 more engineers were elected to membership. About 750 additional applications have been received and are now being processed. After the "grandfather" applications have been cleared it is estimated that 35 to 50 members per year will be admitted by examination.

Six areas of competence have been recognized by the Board in issuing certificates of membership. Sanitary Engineer is used on those certificates where the recognition of general com-



Courtesy Philadelphia Gear Works

30-INCH ROTARY valves on pump discharges at the Southeast and Central Schuykill pumping stations in the City of Philadelphia employ LimiTorque valve controls, one of 12 units.

petence is intended. Sanitary Engineer is also included on the other five types of certificates but on each particular certificate it is followed by one of the following designations to indicate a particular area of competence: Water Supply and Waste Water Disposal, Public Health, Industrial Hygiene, Radiation Hygiene and Hazard Control, and Air Pollution Control.

The Federation

The Federation continued as a dynamic growing organization with a membership of approximately 7,800. Four new associations were granted membership in the Federation at the annual meeting in Boston attesting to its growth. These new associations are in New Zealand, Israel, Mississippi, and Utah.

Since the Federation brings together in one forum representatives of municipality, industry, regulatory agency, consulting firms, manufacturing organizations, and other areas of interest, it has an inherent responsibility to advance the field in the common interest. The following areas are among those for which the Federation is gearing up to make a greater effort:

1. Improved public relations for the entire waste control field. A new committee has been created to tackle this area.
2. Activities to help the small sewage plant operator help himself improve his stature and recognition.
3. A program of integrating into the Federation membership from industry consistent with the magnitude of each generic industrial problem. Industry should be active in this forum so their waste problems can be worked out with their opposite numbers from the municipalities and regulatory agencies.
4. An evaluation of the nuclear wastes field and what steps the Federation should be taking in this new area. A new committee has been assigned this responsibility.

Courtesy Hardinge Co.

THICKENER with auto-raise type mechanism installed in paper mill to reduce waste pollution load.

Significant Trends and Challenges

In reviewing the activities of the past year one begins to envision areas which are a real challenge for the future. In some areas sufficient work has been done to outline with broad strokes of the brush the general approach which will be used in coping with the problems.

Perhaps the greatest challenge facing the entire field is that of attracting competent young technical men. This is a situation which must be faced and the combined efforts and know-how of the best talent available used to make improvements.

It is apparent that fringe-area sanitation is a problem throughout the nation. The solution of this problem will in most cases be costly. The answer to this problem lies in sound, long-range, area-wide planning. In many cases the political subdivisions will need to realize that engineering boundaries and not political ones need apply if this problem is to be solved in the most economical manner. The long range answer thus appears to lie in a common government for the municipality and its environs for those services which can thus be most economically provided.

Another trend which both industry and municipality should recognize is that in many cases all the wastes of an area can in the most economical man-

Courtesy The Jeffry Mfg. Co.

SCUM AND GRIT collector at sewage works in Bluffton, Ohio.

ner be handled in a common plant. The industries in many cases will have to provide pretreatment before discharging to the municipal system.

Stabilization lagoons are continuing to grow in acceptance and are proving themselves in wider areas of the country as a satisfactory method for treating sanitary sewage. They obviously have their greatest promise as the treatment approach for small municipalities where costs have always been a serious deterrent.

Persons experienced in the agricultural field have always been concerned with the soil remaining high enough in fertility and sufficiently surviving erosion so that the rapidly growing national population can be properly fed. Sewage sludge, through its humus and trace element content, can supplement soil fertility. More thought must be given, however, to getting this sludge in one form or another back on the land. Another significant approach is the experimental efforts to date to recover vitamin B_{12} for stock feeding purposes from such sludge.

Adequate water is becoming a problem for greater areas of the nation. The re-use of treated sewage and industrial wastes as a source of low grade water is being more carefully scrutinized. It is obvious that more effluents of this type must be re-used to meet the water demands of the future.

The waste treatment climate is improving. The realization is growing that all areas of the waste treatment field should join hands in the interest of evolving the soundest answer and thus advancing the common welfare. Municipality, industry, and regulatory agency are properly tending to think of the whole problem and the cooperative solution.

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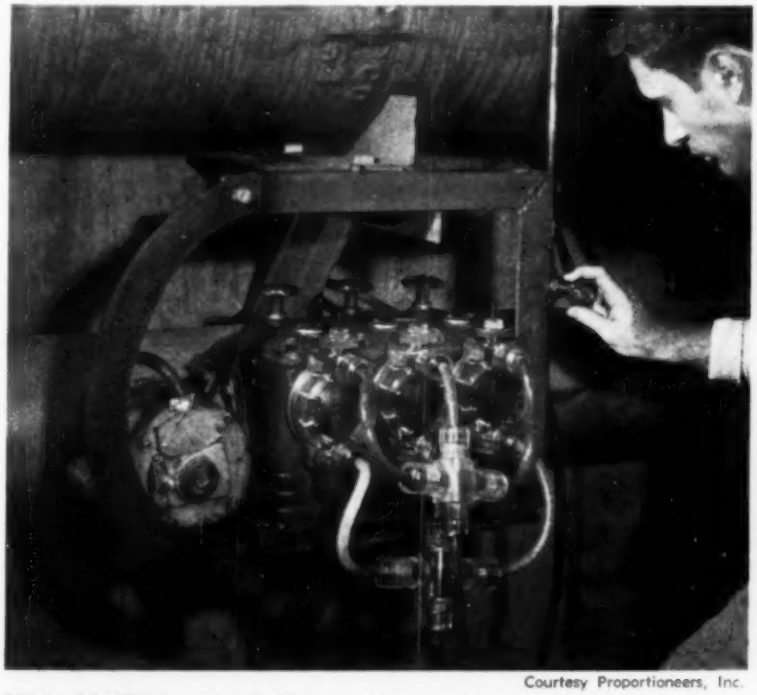

Courtesy Proportioneers, Inc.

FOAM CONTROL at Miami, Fla., sewage plant is accomplished by adding special defoamers through a proportioning pump.

Courtesy Southern Cen-Vi-Ro Pipe Corp.

AT LONG KEY, Fla., 600 ft of 30-in. pressure sewer pipe was laid subaqueous.

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Lindsay Chairman of Water, Sewage and Sanitation for ACS

Frederick K. Lindsay is the new 1957-58 chairman of the Division of Water, Sewage and Sanitation Chemistry, for the American Chemical Society. Lindsay is with the National Aluminate Corp. New chairman-elect is William L. Lamar, of the U. S. Geological Survey, Ohio Basin. H. B. Gustafson of Infilco, Inc., is again serving as secretary. Treasurer is John J. Maguire of W. H. and L. D. Betz Co.

Standing or Moving?

"The great thing in the world is not so much where you stand as it is in what direction you are moving."
—Justice Oliver Wendell Holmes

IN 20 TO 40 MINUTES, this 4000 gallon tank truck can be unloaded at a water purification plant using . . .

Liquid Alum *as a coagulant*

by R. W. OCKERSHAUSEN, Technical Service, General Chemical Division, Allied Chemical and Dye Corp., New York, N. Y.

EDITOR'S NOTE: For a water works man employing coagulation here are the answers to a number of questions he may have about liquid alum: What is it? Where is it used? What is its availability? How should it be stored and handled? How is it used? How does it compare costwise with dry filter alum? etc.

■ A CENTURY OLD CHEMICAL has "gone modern." Indeed, it "went modern" twenty years ago, when shipment in quantity began of commercial aluminum sulfate in concentrated liquid form. Aluminum sulfate is used by two large groups, namely paper mills which take about seventy per cent of the tonnage, and water works which consume the balance of about thirty per cent.

Plants for making liquid aluminum sulfate can be located only where a large "local" consumption exists. Paper mills concentrate in well defined areas and provide the sizable tonnage needed to justify alum producing facilities. Water works, though smaller users, when near these facilities are able to take advantage of this product.

"Dry alum," "filter alum," or "paper-makers alum," as it has been called, has been supplied to water plants and paper mills in slab, lump and ground forms. Solutions of alum have been used for decades; these were made by dissolving the slabs or lumps in suitable tanks to strengths usually of five to fifteen per cent. In contrast to these weak solutions, laboriously made at the point of use, commercial liquid alum is now being shipped at nearly fifty per cent strength. Where consumers are within a reasonable shipping distance, liquid alum can be attractive financially, will reduce handling and labor costs, will promote plant cleanliness, conserve space, and contribute to employee safety.

What Is Liquid Alum

Aluminum sulfate is made by reacting bauxite or high alumina clays with sulfuric acid and water. After the reaction the liquors are treated in various ways to reduce impurities and insoluble material. Evaporation of excess water results in a syrup which when cooled, solidifies into a cake or slab form. Grinding the cake produces the material with which most plants are familiar. The dry product has the formula—$Al_2(SO_4)_3 \cdot {}_nH_2O$ in which the "n" is approximately 14. The 14 molecules of water of crystal-

Fig. 1—PRINCIPAL liquid alum producing plants. General chemical Division, Allied Chem. & Dye Corp.

lization give a dry product with 17 per cent Al_2O_3 content.

By certain steps in manufacture, the liquors can be controlled at approximately 8.3 per cent Al_2O_3 which is close to a fifty per cent solution of the dry alum. Liquid alum differs from dry alum only with respect to its water content. The paper plant and water purification processes are not changed by the form of the alum; only the facilities for handling the liquid form differ.

Availability—Where Manufactured

Tonnage demands for aluminum sulfate have steadily increased with the expansion of the paper industry and the enlargement of water purification plants to care for the growth in population. Paper mills tend to concentrate in some seven or eight geographic areas where water, raw materials and transportation are available. To better serve these large users, approximately forty liquid alum manufacturing plants have been located in those areas.

Figure 1 shows the location of a number of the present plants. As numerous as the alum plants are, it is obvious that there are areas where liquid alum is not available, and will not be available until a greater consumption warrants a producing installation.

In general, it is uneconomic to ship liquid alum more than 100 miles; the reason is the necessity of paying freight charges for two tons of liquid product, which is the equivalent of one ton of dry alum. Added to the double freight charge is the necessity of tank-trucks or tank-cars returning to the producing works empty, that is, without a payload.

Advantages in a lower base cost of the liquid alum are offset when long hauls are involved. A study of dry versus liquid alum freight rates may indicate that the longer haul for liquid alum can be justified, if the producing location for dry alum is remote and a high tariff exists.

Who Can Use Liquid Alum

Liquid alum should be considered whenever a new water plant or paper mill is being designed. It is cheaper and simpler to design for liquid storage tanks before plants are constructed, than to make the conversion in existing plants. In a time of ex-

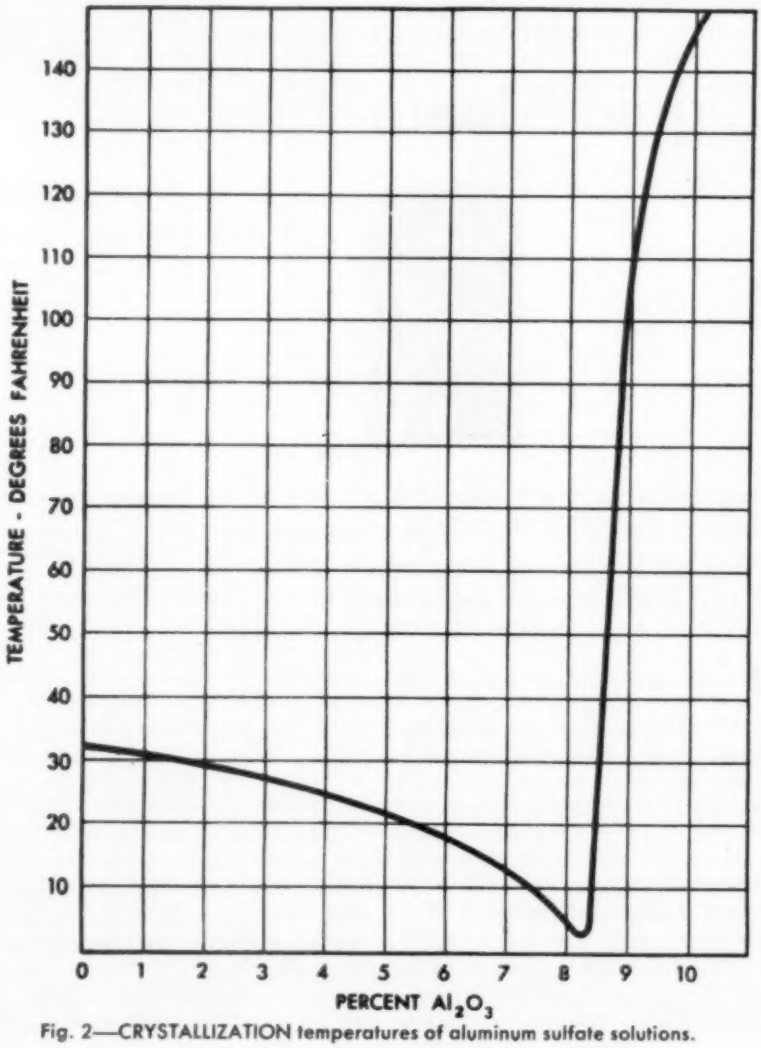


Fig. 2—CRYSTALLIZATION temperatures of aluminum sulfate solutions.

pansion and modernization, liquid facilities can be planned for, if chemical rooms and feeding equipment are part of the expansion.

When chemical feeding equipment is to be retired because of age, the economics of new dry-feed equipment may be compared with a liquid alum storage and feeding set-up. Finally, in existing paper or water plants a liquid alum installation may be justified when the savings per ton are sufficient to amortize the tanks and feeders in a reasonable time.

Consumers of less than 100 tons of dry alum per year will not usually be able to discard dry-feeders, and justify the investment in liquid facilities (which may cost from $3,500 to $7,500 for minimum equipment). Some exceptions in smaller water plants deserve mention. In several instances dry alum was shipped a great distance and carried high freight charges. In these cases, when the lower base cost for liquid alum from a near-by source was considered, and the saving in freight was added, total savings in the order of $7 to $10 per ton (dry basis) resulted.

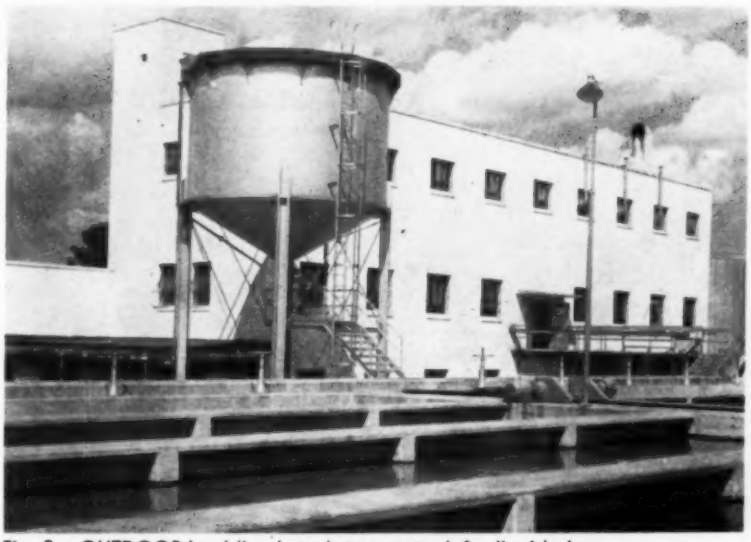


Fig. 3—OUTDOOR lead-lined steel storage tank for liquid alum.

Table 1
Characteristics of Aluminum Sulfate Solutions

			TEMPERATURE—60° F		
°Be'	Sp. Gr.	Lbs./Gal.	%Al_2O_3	Equiv. % Dry	Lbs. Dry/Gal.
1	1.0069	8.40	0.19	1.12	.09
2	1.0140	8.46	0.39	2.29	.19
3	1.0211	8.52	0.59	3.47	.30
4	1.0284	8.58	0.80	4.71	.40
5	1.0357	8.64	1.01	5.94	.51
6	1.0432	8.70	1.22	7.18	.62
7	1.0507	8.76	1.43	8.41	.74
8	1.0584	8.83	1.64	9.65	.85
9	1.0662	8.89	1.85	10.88	.97
10	1.0741	8.96	2.07	12.18	1.09
11	1.0821	9.02	2.28	13.41	1.21
12	1.0902	9.09	2.50	14.71	1.34
13	1.0985	9.16	2.72	16.00	1.47
14	1.1069	9.23	2.93	17.24	1.59
15	1.1154	9.30	3.15	18.53	1.72
16	1.1240	9.37	3.38	19.88	1.86
17	1.1328	9.45	3.60	21.18	2.00
18	1.1417	9.52	3.82	22.47	2.14
19	1.1508	9.60	4.04	23.76	2.28
20	1.1600	9.67	4.27	25.12	2.43
21	1.1694	9.75	4.50	26.47	2.58
22	1.1789	9.83	4.73	27.82	2.74
23	1.1885	9.91	4.96	29.18	2.89
24	1.1983	9.99	5.19	30.53	3.05
25	1.2083	10.08	5.43	31.94	3.22
26	1.2185	10.16	5.67	33.35	3.39
27	1.2288	10.25	5.91	34.76	3.56
28	1.2393	10.34	6.16	36.24	3.74
29	1.2500	10.43	6.42	37.76	3.93
30	1.2609	10.52	6.67	39.24	4.12
31	1.2719	10.61	6.91	40.65	4.31
32	1.2832	10.70	7.16	42.12	4.51
33	1.2946	10.80	7.40	43.53	4.71
34	1.3063	10.89	7.66	45.06	4.91
35	1.3182	10.99	7.92	46.59	5.12
36	1.3303	11.09	8.19	48.18	5.34
37	1.3426	11.20	8.46	49.76	5.57
38	1.3551	11.30	8.74	51.41	5.81
39	1.3679	11.41	9.01	53.00	6.05

NOTE: BASED ON 17% Al_2O_3 IN DRY ALUM (General Chemical Research Laboratory).

Such savings are unusual and they provided incentive for the smaller users in the area to convert to the liquid product. These users were able to write-off the investment in less than five years. To this category should be added the several plants with awkward handling problems and inadequate storage facilities. The cost of labor for unloading and transferring dry alum, together with some saving in the product, warranted changing to the liquid system.

Some efficiency-minded superintendents consider ease of handling so important that the convenience of handling alum in solution form has added incentive toward converting to the liquid product, when other conditions are favorable. This is one of many factors besides tariffs which must be considered at each location in determining the feasibility of liquid alum use.

Why 8.3 Per Cent Al_2O_3

Since shipment of any liquid product involves the payment of freight on water, it is desirable to save the consumer as much as possible, by shipping the product at the highest concentration that can be readily handled. This further makes for economy in

Fig. 4—DETAILS of piping and valves for liquid alum storage tanks.

keeping storage tanks to a reasonable size. A further consideration is the crystallization or freezing point of alum solutions.

Figure 2 shows that the freezing point is at its lowest at approximately the 8.3 per cent concentration. Trace impurities influence the freezing point, and values of 2°F to 18°F have been reported. For practical purposes, no freezing difficulties will be encountered if the product is stored according to manufacturer's recommendations. Feed-lines should be protected from unusually low temperatures. A concentration of 8.3 per cent Al_2O_3 has been used by most producers as a safe strength to ship.

Properties of Liquid Alum

Liquid alum of 8.3 per cent Al_2O_3 has a weight of 11.15 lb per gal. One gallon has the equivalent weight of dry alum of 5.4 lb. It is approximately a 48.5 per cent solution of dry alum. A rapid method of determining the approximate strength is by use of the Baumé hydrometer. The solution as shipped will test 36.4° Baumé. This is the equivalent of a specific gravity of 1.335. Table 1 gives the concentration of liquid alum for different specific gravities and Baumé readings at 60°F.

Liquid alum solution is acidic and has a pH value of 2.4. The viscosity at different temperatures is given in Table 2.

A typical analysis of liquid alum would be approximately as follows:

Total Aluminum Oxide, Al_2O_3 8.3%
Combined Aluminum Oxide, Al_2O_3 ..... 8.2%
Free Aluminum Oxide, Al_2O_3 0.1%
Total Iron, Fe_2O_3 ..... 0.2%
Insoluble Matter 0.05%

Method of Shipment

Tank-trucks of 2,000 to 4,000 gallons capacity are used for shipping liquid alum. The trend is toward 4,000 gallon stainless steel tank transports. In certain areas rail shipment in rubber-lined or stainless steel tank cars of 8,000 to 10,000 gallons capacity is used. In the case of tank-trucks, pumps or compressors are mounted on the producers' trucks for discharging to the consumers' storage tanks. Where shipment is by railroad, compressors supplying air at 30 pounds pressure are necessary at the receiving station for unloading the tank-cars. The time required for unloading a 4000 gallon tank-truck usually is from 20 to 40 minutes depending on the head. An accompanying photograph shows a typical tank-truck used in this service.

Storage Tanks

The largest single item in a liquid alum installation is the storage tank. The minimum size recommended is 6,000 gallons. This volume is approximately 1.5 times the size of the delivery trucks. Where tank-cars are involved a minimum size of 15,000 gallons is suggested. These are recommended minimums and where large tonnages are consumed, the storage equipment will be sized to hold at least 7 to 10 days supply, depending on the proximity to the producing location.

The space needed for liquid alum can be roughly calculated at 40 pounds (dry equivalent) per cubic foot. This value compares with approximately 60 pounds of dry alum per cubic foot. Bags of dry alum are seldom stacked more than 6 or 7 deep to facilitate both stacking and removal from the pile. On the other hand, tanks for liquid alum will use the same space from floor to ceiling, and greater utilization per square foot of floor space results. Where tanks are on upper floors the question of floor loading must be studied before liquid equipment is installed.

The location of storage tanks may differ between warm and cold sections of the country. The warmer climate in the south enables placement of tanks on the outside, while in colder climates indoor tanks are preferred. It is possible to insulate, and even to heat outdoor tanks in colder climates but this adds to the cost of the installation. Burial of tanks is not favored since it makes inspection and clean-outs awkward. Leaks are uncommon but they can not easily be detected in underground tanks until the losses are great.

Rubber-lined steel or wood, concrete, or steel tanks lined with lead are preferred. Rubber and lead have stood the test for twenty years, and maintenance on the linings during this period has been very low, and in some plants nothing. This fact does not preclude the use of newer self supporting plastic tanks, plastic linings, or plastic bag liners. Such are under test at the present time and it is possible

Table 2
Relation of Viscosity to Temperature

Baume Reading	Per Cent Dry Alum	Viscosity in Centipoises 40° F	60° F	80° F
8.3	10.0	2.4	1.7	1.3
16.1	20.0	3.2	2.3	1.6
23.7	30.0	4.0	2.9	2.0
30.6	40.0	17.5	10.5	6.7
36.4	48.5	43	26	17

the variety of satisfactory materials will expand with experience.

Unsatisfactory results with certain plastic liners were partly due to poor adhesion to the walls, the presence of pin holes, and in the case of one semi-rigid plastic tank to poor mechanical design of the seams. Such difficulties may have been overcome in the equipment now under observation.

Since liquid alum may be shipped as warm as 130°F, the effect of temperature and temperature changes over a period of time on the plastic must be determined. Unlined wood is being used and contrary to numerous failures of wood necessitating lead-lining, several plants report satisfactory results after approximately three years of use. Stainless steel (Type 316) tanks and a glass-lined steel tank

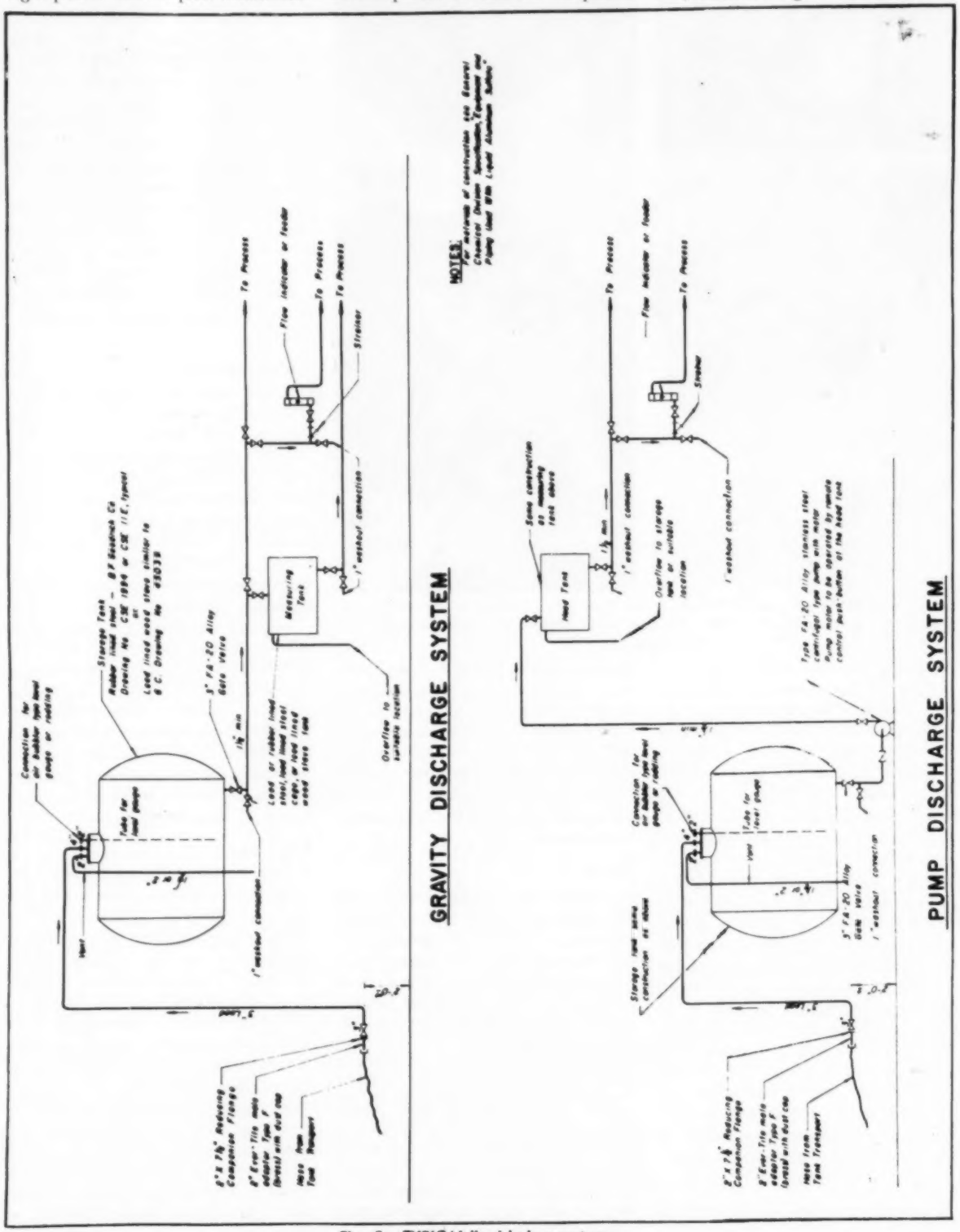


Fig. 5—TYPICAL liquid alum system.

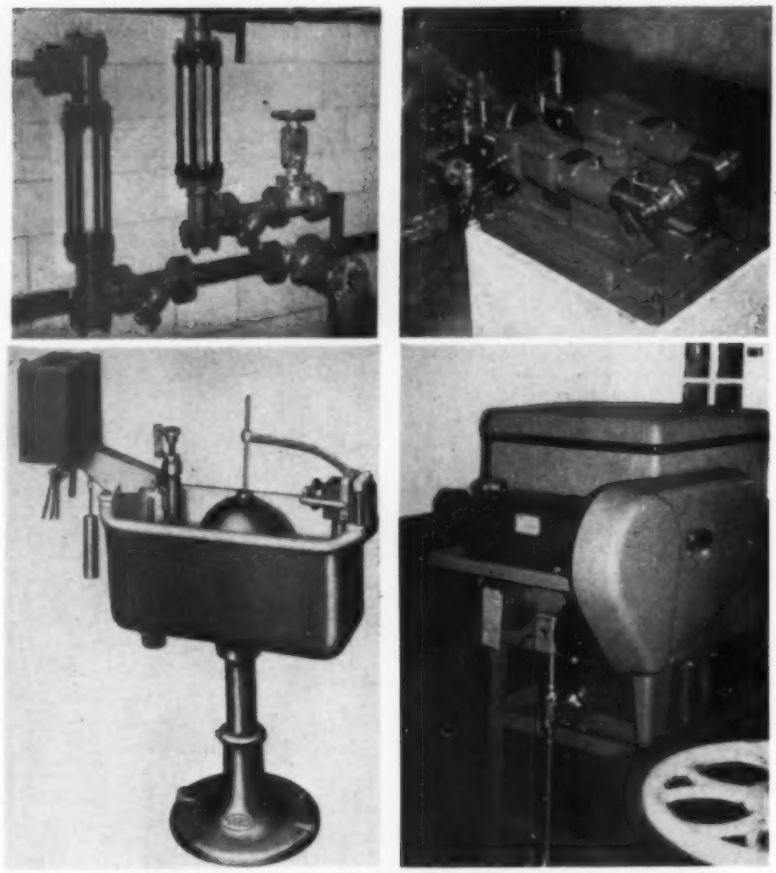


Fig. 6—FEEDING devices for liquid alum. Top left, rotameter; top right, proportioning pump; bottom left, constant head orifice box; bottom right, Roto-Dip.

are giving expected good service.

Figure 3 illustrates a 25,000 gallon lead-lined steel storage tank.

The lead used for lining tanks contains 4 to 6 per cent antimony and is of the "8 pounds per foot weight." Some large installations use "10 pound" lead. In the case of rubber-lined steel, the lining is approximately 3/16 inches thick.

Some plants install loose fitting plank covers for the lead-lined tanks and this reduces evaporation losses. Any loss of water from the liquor tends to produce a more concentrated solution at the surface, and increases the danger of crystal formation. Rubber or lead-lined steel tanks generally are closed. Closed tanks have vents in the top which extend over the side of the tank. When the tanks are equipped with bottom outlets these should be three inches in diameter to allow for easy flushing or cleaning.

Piping

Unloading lines should be 3 inches in diameter and made of antimony lead pipe with ¼ inch wall thickness. Lead pipe should be well supported to prevent sagging. Uscolite, Saran, hard rubber, rubber-lined steel and stainless steel (No. 316) are suggested for feed lines and these should not be smaller than one inch even in the smaller plants. Flush-out connections are desirable.

Valves

Rubber-lined diaphragm valves of the Saunders Patent type or renewable rubber liner valves give long service. Directly under the storage tank a 3 inch gate valve of stainless steel type FA-20 alloy is recommended. Figure 4 shows piping and valve detail in one plant.

Pumps

The manufacturer's tank trucks have pumps or compressors for unloading to the user's storage tanks. When the product must be pumped, as to a head tank, centrifugal pumps with wetted parts of stainless steel type FA-20 alloy should be used.

The manufacturers of liquid alum can supply information on tanks, lines, valves and pumps, and can provide typical prints as in Figure 5.

Feeding

A variety of feeding and feed-control devices are used for liquid alum (See Fig. 6). These include the Roto-Dip, rotameters, proportioning pumps, and constant head orifice boxes. Both concentrated and dilute liquid alum are being fed successfully with all of the feeding devices. They can be installed for manual operation or equipped for automatic control; recording equipment can be included if a record of the feed rate is desired. The experience of chemical feeding and instrument specialists will be helpful in making a choice of such equipment.

Costs of Installations

Every liquid alum installation in a water works or paper mill differs and the cost will likewise vary. Some plants have made the installations with their own personnel, some have done their own lead burning. Unused concrete tanks have been lined and costs have been less in these instances. Some consumers install duplicate transfer pumps and feeders to guard against stoppages.

Minimum facilities, including storage for 6000 gallons, have been installed for as little as $3,500 although a cost of $5,000 may be closer to the average. Recent installations for 12,000 gallon capacities have figured from $8,000 to $10,000. These values may vary in different localities and are cited only as a guide to the magnitude of installation costs.

Conclusions

One of the few opportunities to lower costs for many alum users has been provided by manufacturers of liquid alum. Evaporation, grinding and bagging are eliminated in making the liquid product, and these savings have been passed on to the consumer. There remain areas where liquid alum is still not available because of high transportation charges. In assessing the value of liquid alum for any particular location consideration must be given to the lower base cost of the chemical, freight rates, labor, safety and the cost of the equipment needed to store and feed the product. Where liquid alum use can be justified, a happy consumer usually results.

An understanding of fundamentals is necessary in order to determine the . . .

Torque Characteristics *of Butterfly Valves*

by A. E. HATCH and W. H. CHAMBERLAIN, respectively, Sales-Engineer and Development Engineer, Builders-Providence, Inc., Div. of B-I-F Industries, Inc., Providence, R. I.

EDITOR'S NOTE: This is the second of two articles on the selection and sizing of 90 deg. seated butterfly valves. Part I appeared in the September 1957 issue of this magazine.

BEFORE the *total operating torque* required to properly operate a given butterfly valve can be determined, it is necessary to have a clear understanding of the forces to be considered. Total operating torque is a summation of the following:

1. Fluid-dynamic torque—which always tends to close the valve.
2. Bearing friction torque—which occurs when valve is moved and acts to oppose rotation.
3. Seat friction torque — which results from the friction of the valve edge against the seat and acts to oppose rotation.

Additional minor torque components are present in the form of:

4. Residual friction torque—consisting of:
   a. Disc hub friction at the valve seat.
   b. Stuffing box friction.
   c. Thrust bearing friction.
5. Hydrostatic torque—which is present only when closed valve is filled with liquid *on just one side.*

Determining the torque requirements of a given valve is simplified by these facts: the seating friction drops rapidly as the valve leaves the fully closed position; the fluid-dynamic torque rises very gradually with this first movement of the valve. These characteristics are graphically shown in Fig. 6.

The use of the torque curve shown in Fig. 5 does not require the valve angle lines. They serve to give extra information only. When this torque curve is presented without the angle lines, it is a single line torque curve showing C_t as a function of the angle.

It should be pointed out that in the use of this curve, the computation of the value of the maximum torque does not depend on accurately locating the point of tangency on Fig. 5, but rather on the point at which the tangent line intercepts the vertical axis.

We believe that the use of the method noted here requires less computation effort to determine the maximum fluid-dynamic torque encountered by a valve in a system, than does computation with other single line torque coefficient curves. Actually, it is difficult to compare the two methods because the complete solution of the older method requires a graphical plot of several solutions to find the point of maximum torque. It may be a matter of opinion but we believe the method proposed here is less cumbersome than other methods.

Torque Components

The required operating torque can thus be found as *the sum of seat friction torque and bearing friction torque,* or as *the sum of fluid-dynamic torque and bearing friction torque,* whichever is larger. An additional small amount of torque should always be added to take care of residual torques, and then the sum of these torques multiplied by a safety factor.

Hydrostatic torque reaches significant values only in the larger valve sizes, and then only when one side of the valve is drained. Its maximum value, in a horizontal line with a horizontal valve shaft, is $0.59\ WD^4$ pound-feet where:

W = fluid density (lb/cu ft)
D = valve diameter (ft)

Fluid-dynamic torque depends upon the particular characteristics of the system. This torque may be expressed in the two following equations . . . through dimensional analysis:

$$T = 62.4\ C_t\ D^3 \Delta H \qquad \text{Eq. 8}$$

where ΔH = valve pressure drop (ft of water) and

$$T = C_d\ D^3 \frac{W V^2}{2g} \qquad \text{Eq. 9}$$

where $\frac{W V^2}{2g}$ = dynamic pressure (psf)

C_t = torque coefficient for use with pressure drop

C_d = torque coefficient for use with dynamic pressure

In both these expressions, T is the torque in pound-feet; D is the valve

diameter in feet; C_d and C_t are experimentally determined coefficients and are functions of the complete system geometry and of Reynolds Number. Included in system geometry are valve shape, adjacent piping arrangements, and disc angle. At ordinary rates of flow, the effect of Reynolds Number is negligible, and the effects of valve shape and adjacent piping are small compared with the effect of disc angle.

Maximum fluid-dynamic torque must be obtained from the diagram (Fig. 5) because when coefficient C_t and C_d are plotted against the disc angle, α, the unfortunate fact emerges that both coefficients attain their highest values at a point where the actual torque encountered is well below the maximum.

Determining Maximum Fluid-dynamic Torque

For a valve installed in the basic system shown in Fig. 1 of Part 1 of this article, and with $\triangle H_o$ and K known, the *maximum fluid-dynamic torque* can be found as follows:

Step 1—In Fig. 5, draw a line with slope-K, and move this line parallel to itself until it is tangent to the fluid-dynamic torque curve (Example is for K = 16).

Note: As stated in Part I, "For the convenience of applying Equation 1, the equivalent pipe friction and the discharge loss are combined into one system loss coefficient, K."

Step 2—Read the intercept of this line with the $1/C_t$ axis (Example is 53).

Step 3—Use this value of $1/C_t$ in the formula for fluid-dynamic torque shown in Equation 10.

$$T_{max} = \frac{W \triangle H_o D^3}{1/C_t} \qquad \text{Eq. 10}$$

where W = fluid density (lb/cu ft)
$\triangle H_o$ = total system head loss (ft)
D = valve diameter (ft)
C_t = a function of system geometry and Reynolds Number as previously defined.

If valve diameter (D) is less than line diameter, correct K by means of formula shown in Equation 4 in Part 1 of this article.

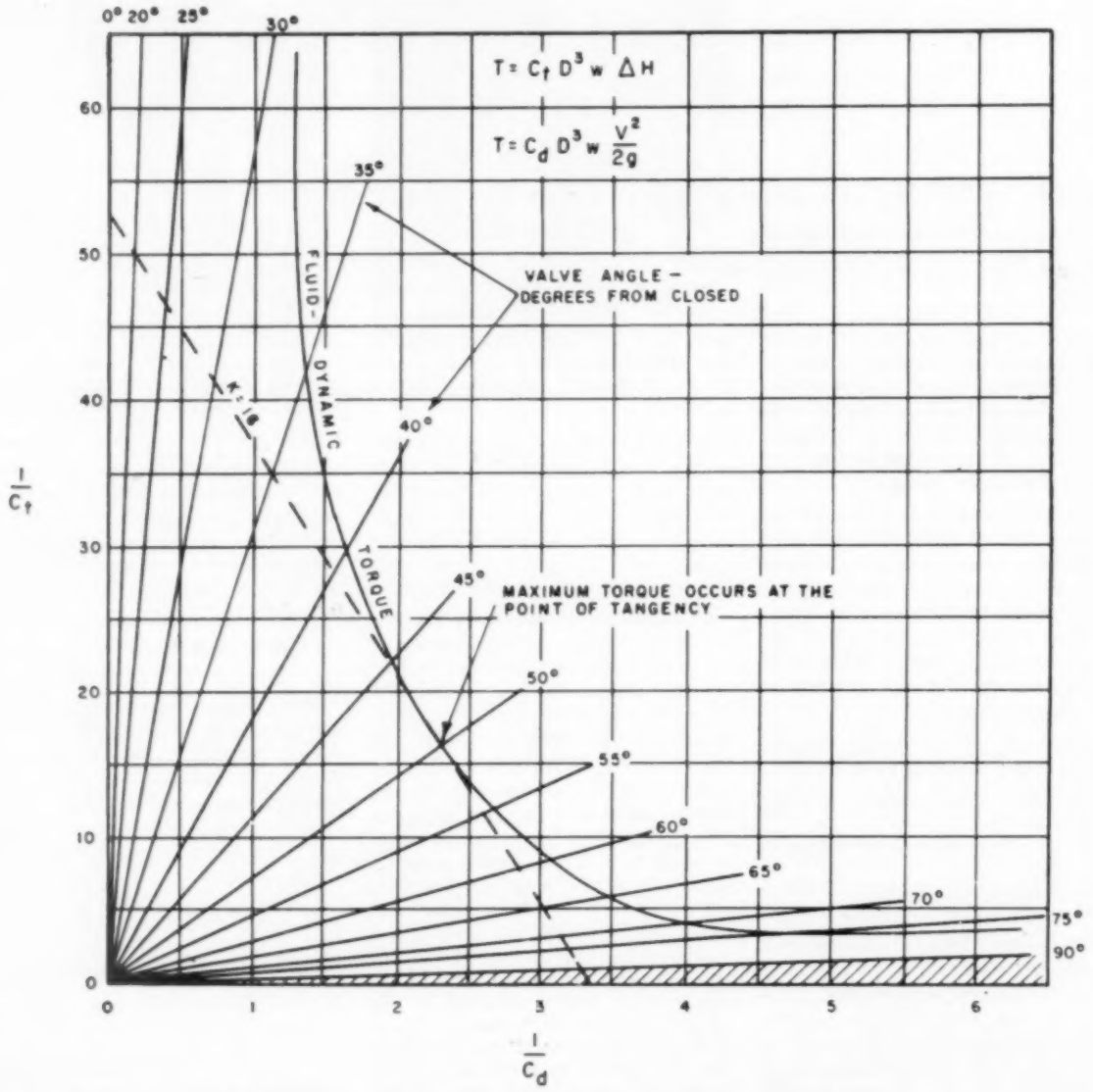


Fig. 5—TORQUE CHARACTERISTICS of rubber seated 90 deg. butterfly valves.

Now if these expressions are applied to the example given in Part I of this article, we have an example solution to the problem of Fluid-Dynamic Torque Evaluation:

Consider two installations in which $\triangle H_o = 62$ ft. In one case $K = 251$ and in the other case $K = 15.7$. In the case for $K = 251$, you will note that a line tangent to the torque curve at slope 251 would intersect the $1/C_t$ axis off scale. This means the maximum fluid-dynamic torque is so low as to be inconsequential. However, the point of intersection can be established and in this case $1/C_t = 376$. For the case in which $K = 15.7$, $1/C_t = 52$.

Now solving for the fluid-dynamic torque in each case:

For the 36-in. valve:

$$T_{max} = \frac{W \triangle H_o D^3}{1/C_t}$$

$$= \frac{62.4 \text{ lb/ft}^3 \times 62 \text{ ft} \times (3 \text{ ft})^3}{376}$$

$$= 278 \text{ lb-ft}$$

For the 18-in. valve:

$$T_{max} = \frac{W \triangle H_o D^3}{1/C_t}$$

$$= \frac{62.4 \text{ lb/ft}^3 \times 62 \text{ ft} \times (1.5 \text{ ft})^3}{52}$$

$$= 251 \text{ lb-ft}$$

It must be remembered that in sizing a butterfly valve operator . . . valve bearing friction torque, valve seating torque, and a safety factor must be taken into consideration in addition to fluid-dynamic torque.

In this article we have purposely avoided computing on torques other than the fluid-dynamic torque as they vary with each design. For example, the 90 deg. seating valve has torques much different from the angle seating type. In addition, manufacturers undoubtedly use different bearing loadings and safety factors.

To avoid these lengthy calculations on water works valves, we recommend that the torque values in AWWA Specifications C-504-55T be used to determine safe values of operator torque. When conditions indicate possible reductions in operator size with consequent lower costs, valve manufacturers are glad to perform these calculations.

Summary (Parts I and II)

A) Basic Rubber-Seated Butterfly Valve Characteristics:
   1) A uniformly changing coefficient of flow vs. degree of opening.
   2) Low head loss when in wide open position.
   3) Bubble-tight shut-off.

B) Rule of Thumb for Size Selection for Control:

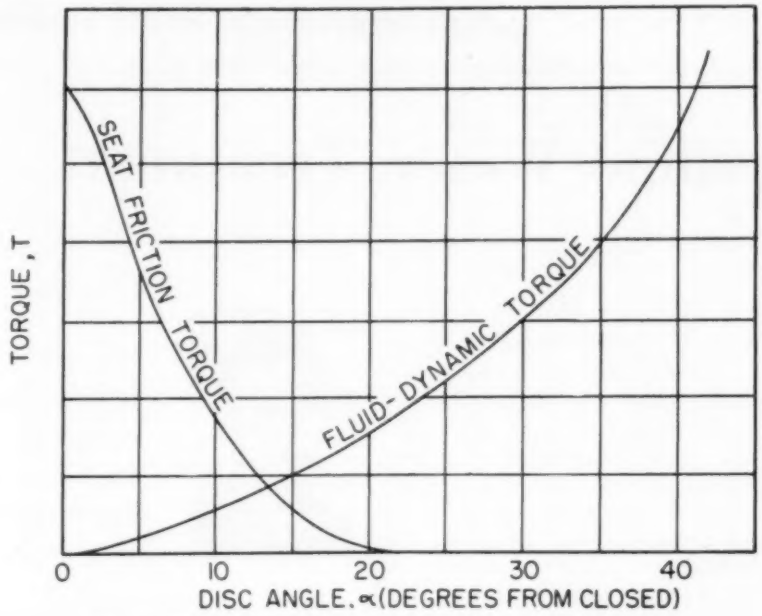


Fig. 6—FLUID-DYNAMIC torque coefficients of butterfly valves.

Choose a valve that gives a maximum velocity of 16 fps when the valve is fully open.

In Part I, the Rule of Thumb No. 1, says in effect that the valve must first be sized for flow requirements and then corrected, if necessary, to meet other requirements, e.g. the selection should be checked to be sure that it will not produce flow losses greater than desired. The advantage of this rule is that it leads directly to a good compromise between all of the size influencing criteria which include control characteristics, wide open loss, energy dissipation, velocity past the rubber seat, and fluid dynamic torque.

The selection of 16 ft per sec as the particular value to use on this rule was based on the AWWA Specifications which limit line velocities to this value. If it were not for this limit, the rule might have been set for about 20 ft per sec and a special limit for protecting valve seats would be higher yet, but it would vary with design details.

(Note: This rule is not given primarily for protection of rubber seats; it is for a quick and easy solution of most problems. For special cases, a more complete analysis of the problem should always be made.)

C) In general, the *best* control valve is the smallest control valve consistent with required line capacity and allowable velocity through the valve.

D) Total operating torque is a summation of:
   1) Fluid-dynamic torque.
   2) Bearing friction torque.
   3) Seat friction torque.
   4) Additional minor torques.

E) In sizing a butterfly valve operator, valve bearing friction torque, valve seating friction torque, and a safety factor must be taken into consideration in addition to fluid-dynamic torque.

Tests for Short-Circuiting in Settling Tanks

To determine whether unsatisfactory operation of treatment works was due to reduction of retention time by short-circuiting, London County Council have made flow studies using both radioactive isotopes and oil-soluble dyestuffs as tracers. Isotopes were found very good for large works where the costly apparatus and elaborate techniques were justified. Stringent precautions were necessary against hazards from the large doses needed.

In using dyes soluble in oil but insoluble in water, simple equipment sufficed, and specialized skill was not called for. Five pounds of a very finely ground red powder known as Oil Red T.A.X. was wetted with Lissapol N to a paste in two buckets which were then filled with mixed liquor, and the contents were dumped as a single slug into the tank inlet. At intervals of 10 minutes samples were drawn from various parts of the tank and sludge weirs. Samples were extracted with white spirit, and relative dye content determined in a photo-electric colorimeter.

For future water supply planning it may be desirable to consider the improvements available in

Saline Water Treatment

This article by RALPH H. SIEVERS, JR., is based on research conducted by the author while a student at the University of Illinois. At the present time Mr. Sievers is a First Lieutenant in the Corp. of Engineers of the U. S. Army.

IN RECENT YEARS there has been considerable improvement and new development in the means of converting saline water to usable water and reducing the cost of those processes. This improvement, when considered in connection with growing population and increasing per capita and industrial water use, raises the question as to what has been the effect of these new developments on the planning of our seaboard water supplies. An answer to this question was sought in the study here set forth.

The newly developed processes for the conversion of saline water have been, in a measurable degree, effective in lowering the cost of the treated product. Table 1 shows how marked is the difference in cost of processing from that of the multiple-effect evaporation process.

The electrodialistic process employs the properties of semipermeable selective ion membranes to remove equivalent amounts of anions and cations from the water with pretreatment by sodium zeolite to reduce precipitation of certain cations upon the membrane. Additional experiments with this process have indicated that by substitution of an acid pretreatment for the sodium zeolite a reduced cost in the range of $0.50 per 1,000 gallons may be obtained. Such a cost would be a reduction of 62 per cent from the cost for multiple-effect evaporation.

Reasons for Development

Research into improving the means of saline water conversion has been stimulated by several factors. The Department of the Interior has been conducting a Saline Water Conversion Program since 1952, and the Armed Services have maintained a continued interest in the field.

Most basic, however, has been the nation's growth and the increased demands upon its often limited fresh water resources. Low-cost usable water from the sea would provide a solution for the problem of a limited fresh water supply of some communities. Even if the cost were moderate it might enter into planning in some of the following ways:

1. To provide for the demands of new expanding industry.
2. To eliminate the need for expensive additional fresh water reservoir capacity.
3. To provide a standby suppy for the improvement of fire protection or for emergencies brought on by drought or flood.

To provide a plant for the foregoing, based on the 2-mgd capacity used in Table 1, would require a capital outlay of between $750,000 (for the ion exchange process) and more than $3,000,000 (for the vapor-compression distillation process). The electrodialytic plant would cost from $1,000,000 to $1,500,000.

There seems to be ample cause for the consideration of saline water treatment. The question becomes one of how supply planning has been affected.

Effect on Planning

In an effort to secure a picture of the effect of the new methods of treatment on the planning of seaboard communities, a questionnaire was sent to 50 representative cities on both oceans and the Gulf of Mexico. Replies to this survey are shown in Table 2, which shows that the communities have an average cost per 1,000 gallons of $0.24, that their present works are sufficient for an average of about 6 years without major expansion or renewal and that more than 40 per cent of them have sources of supply that will be insufficient within 25 years.

Despite the obvious shortage and problems, however, only one community, Elizabeth City, N. C., has definitely considered the use of sea water in its water supply planning, but it has taken no action due to the present high cost of conversion. Other cities, with cost ranging from $0.04 to $0.70 per 1,000 gallons, with inadequate sources of supply and the need for plant renewal, did not consider the use of sea water.

TABLE 1

Cost of Treating Moderately Saline Water

(Based on Production of 2 Million Gallons per Day)

Process	Cost (Approx.), $ per 1,000 gal.
Multiple-effect evaporation	2.50
Flash-type distillation	1.40
Ion exchange	0.90
Vapor-compression distillation	0.85
Electrodialysis preceded by sodium zeolite softeners	0.65

It is seen that great improvement has been made in the processing of saline water, and that a need for such a process exists in many seaboard communities. One of the goals of the Saline Water Conversion Program is to achieve a cost of approximately $0.40 per 1,000 gallons. Even though this is $0.15 above the average found in the survey, and is a goal that is yet to be attained, the critical situation in which many communities find themselves makes it likely that sea water conversion will find a place in seaboard water supply planning.

That this has not yet occurred is due to its high cost and the continued development of all available fresh water supplies. However, fresh water supplies are exhaustible and use of saline water processing, although more costly, delayed, and limited, must be considered inevitable.

TABLE 2

Results of Water Planning Survey of Seaboard Communities

City	Population	Cost, $per 1,000 gal.	Expected System Life, yr	Source Sufficient for Next 25 Years	Term of Latest Bond Issue, yr	Sea Water Considered in Planning
Norfolk, Va.	365,000	0.20	10	Yes	25	No
Long Beach, Calif.	298,000	0.15	5	Yes	20	No
Mobile, Ala.	180,000	0.07	30	Yes	30	No
St. Petersburg, Fla.	165,000	0.10	15	Yes	20	No
Charleston, S. C.	150,000	0.13	5	Yes	30	No [1]
Ocean City, N. J.	100,000 [2]	—	—	—	—	No
Fort Lauderdale, Fla.	75,000	0.25	0	No	—	No
Galveston, Tex.	73,000	0.04	2	Yes	—	No
Perth Amboy, N. J.	60,000	0.50	5	Yes	—	No
Biloxi, Miss.	50,000	0.08	10	Yes	—	No
Key West, Fla.	40,000	0.42	0	Yes	20	No
Ventura, Calif.	30,000	0.04	0	No	—	No
Warrington, Fla.	28,000	—	5	Yes	—	No
Brunswick, Ga.	25,000	0.11	15	Yes	30	No
Santa Cruz, Calif.	24,000	0.11	0	Yes	20	No
Oceanside, Calif.	20,500	0.10	15	Yes	20	No
St. Augustine, Fla.	17,000	0.23	10	No	25	No
Elizabeth City, N. C.	15,000	0.25	0	No	20	Yes [3]
Bradenton, Fla.	15,000	0.40	—	—	20	No
Arcata, Calif.	10,000	—	2	No	20	No
Beaufort, Morehead, N. C.	9,000	0.38	—	Yes	—	No
Anacortes, Wash.	8,100	0.04	0	Yes	30	No
Aransas Pass, Tex.	8,000	0.10	2	No	20	No
Morro Bay, Calif.	4,000	0.06	—	No	—	No
Punta Gorda, Fla.	3,500	0.23	2	No	20	No
Half Moon Bay, Calif.	3,200	0.60	10	No	14	No
Montauk, N. Y.	3,000 [2]	0.70	5	No	—	No
Gulf Stream, Fla.	130	0.12	3	No	—	No
Average	—	0.24	6.4	42% No	22½	1 Yes

[1] Possibility has been discussed should cost become low enough.
[2] Summer population.
[3] Construction of new reservoir and supply line could be avoided if economical process is developed.

Contract Signed For Largest Public Project in Country's History

$25,000,000 Trunk Sewer

A contract between sixteen communities in New Jersey and the Bergen County Sewer Authority for a $25,000,000 trunk sewer was recently signed. The undertaking, said to be the largest public project in the country's history, is known as Stage 2 of a long-range plan.

Construction on the new trunk sewer started on Feb. 2, and it is estimated that 18 months will be required to complete the project. No major delays in acquiring easements are expected because most of the line will run through streets or publicly owned lands.

Philadelphia A.S.C.E. Organizes Hydraulic and San. Engr. Div.

The Philadelphia Section, American Society of Civil Engineers, at their first official meeting, established the permanent organization for the Hydraulic and Sanitary Engineering Division.

The following officers were elected: Chairman, Elwood L. Bean; Vice Chairman, Romeo A. Falciani; and Secretary, Walter Purdom.

The main sections of a proposed Constitution were passed and Philadelphia Deputy Water Commissioner Arnold gave an illustrated discussion concerning the in-place cleaning of water mains.

Weston & Eckenfelder Associates Change Name

The consulting firm of Weston and Eckenfelder Associates has changed its name to: Roy F. Weston, Inc.

The firm will remain at its present address in Newton Square, Pa., and Mr. W. Wesley Eckenfelder, Jr., Associate Professor of Sanitary Engineering at Manhattan College and co-founder of the firm, will retain his present status of Consulting Associate.

CORRECTION

To Pages 509 and 510, Nov. 1957 Issue

One of the authors, A. E. Greenberg, has called our attention to a couple of errors that appeared in the article "Alkalinity Measurements in Water."

On page 509, the first line after equation (4) should read "The ionization constant for reaction (3), K_3 . . ."

On page 510, the Figure should be captioned "Fig. 1," not Fig. 7, and the caption should read "Titration curve of 1,000mg/l Na_2CO_3 with H_2SO_4."

We wish to express our apologies to the authors and especially to thank Mr. Greenberg for calling our attention to this.

Acceptability of Membrane Filter Procedure

The Executive Committee of the AWWA Board of Directors, on Nov. 7, 1957, adopted the following resolution:

Whereas the current (tenth) edition (1955) of *Standard Methods for the Examination of Water, Sewage, and Industrial Wastes* includes the membrane filter procedure as a *tentative* method for the determination of the presence of members of the coliform group, and

Whereas the US Public Health Service has, by official action, taken on Mar. 1, 1957, accepted the membrane filter as an alternate to the completed test for members of the coliform group,

Therefore, be it resolved that the American Water Works Association accepts the membrane filter procedure as an alternate to the completed test when the following conditions have been met:

a. The administrator of the laboratory concerned has satisfied himself by comparison tests that the membrane filter procedure produces results which are essentially equal to the completed test, and

b. The state sanitary engineering laboratory approves the application of the membrane filter procedure to the public water supplies under its jurisdiction.

REPORT FROM ABROAD

INSTITUTE OF SEWAGE PURIFICATION

Meeting in Margate, England, emphasizes the importance and influence on sewage treatment practice of . . .

Industrial Effluents *in municipal sewers.*

■ THE TREATMENT AND DISPOSAL of trade effluents and the many problems associated with this particular aspect of public health formed the backbone of the I.S.P. Conference held at Margate this year, and is just one more indication of the influence industrial development and industrial effluents are beginning to have on sewage treatment practice in Great Britain.

JOHN FINCH, Manager of the Sewage Disposal Department, Slough, England, presents here another "Report from Abroad."

As is usual at these Conferences, where a comparatively few technical papers are presented, the standard of both the contributions and the discussions was very high. Only one inspection trip was scheduled during the Conference, but that was to the London County Council's Northern Outfall Works at Beckton, now in course of reconstruction, a visit eagerly anticipated by those delegates interested in new ideas in design and construction.

GRIT CHANNEL at Landon County Council's North Outfall Works at Beckton, showing grit-removal device.

Presidential Address

The new President of the Institute, Dr. S. H. Jenkins of the Birmingham Tame & Rea District Drainage Board, is a very popular choice, having done considerable work in the best interests of the Institute.

In his presidential address Dr. Jenkins included a tribute to the old West Riding of Yorkshire River Board and the wonderful work it did under the stalwarts who took the helm. With respect to the industrial waste problem he said:

"Some of these trade effluent problems must by now be quite well known to many of you, but for the sake of our lay delegates, let me emphasize them.

"First, the great increase in water consumption by industry results in larger volumes of effluent, for which local authorities must provide bigger sewers to carry the wastes to the sewage works. There may be substances in the trade wastes which even cause difficulties in conveying them through the sewers.

"Furthermore, when the mixture reaches the sewage works, it may be found that a works which is good enough to purify the domestic sewage is quite unable to deal with the mixture. Enlargement of the works then becomes necessary, sometimes at a cost out of proportion to the volume of trade waste present.

"Even after heavy expenditure of public money, it may turn out that the reasonable requirements of a river board or of a riparian owner can no longer be met because of the presence of these factory wastes.

This is no fanciful exaggeration, as such a state of affairs already exists in several parts of the country.

"Worse still, the load of industrial impurity at some sewage works is so heavy that even with the expenditure of large sums of money, one can never hope to turn out a really pure effluent. Consequently, sewage purification services ought to be receiving every possible financial assistance because in 1937, when Parliament passed the Drainage of Trade Premises Act, it gave industry encouragement to make full use of public sewers for the disposal of trade wastes. This Act was rightly hailed as a measure that would do away with one of the worst features of pollution, because for years everyone concerned with pollution had complained about the serious effects caused by trade effluents which were allowed to flow into rivers.

"Industry is making full use of its powers under the Act. Local Authorities may lay down conditions under which they are prepared to take trade effluent, and make a charge for what they accept, but the fact remains that they often find difficulty in purifying liquids they have agreed to accept; in some cases, the charges they make fall far short of the cost of the plant that would be needed if the manufacturer had to purify his effluent to the same standard, and much less than the cost of restoring the original purity of the sewage works effluent. . . ."

He said further that so many varied interests are concerned with the supply and availability of water, with the disposal of waste water into sewers and rivers, and with the amenities which rivers provide, that it would be in the public interest to forecast some future trends. Also, that the questions that ought to be asked concern the probable demand for water, especially for industrial purposes; the means of meeting this demand; the effect of the present trends of industry and movements of population on water supplies; the effect of the increasing consumption of water for manufacturing purposes on the efficiency of sewage purification plants and on the pollution of rivers and estuaries; the cost of combatting these effects; and how the law relating to trade effluent discharges to sewers can be improved.

GRIT STORAGE and loading hopper

Flax Retting

The first technical paper, by Ing. Ad. Petru, head of the Central Administration of Water Management, Prague, Czechoslovakia, was entitled "Biological Filter Installation and Final Treatment of Re-Used Retting Wastes."

During the course of the discussion, Mr. Petru gave some interesting details of developments in Russia in the sewage and industrial effluent field. (In conversation with the representative from the Prague Institute of Chemical Technology, Dr. Madera, at a later date, the writer learned that the Moscow sewage treatment plant was in fact a dual scheme—activated sludge followed by biological filters—and had been installed some years.) One discussor noted that it was "a good thing to see something filtering through the Iron Curtain, even if only sewage!" Dr. B. A. Southgate, Director of the Water Pollution Research Laboratory, gave the British point of view relating to flax retting procedure, thereby putting Mr. Petru's paper in better perspective.

GENERAL VIEW of Hartley aeration plant

PADDLES 10 feet in diameter aerate sewage in Hartley-type plant

Sludge Drying and Disposal

A paper on "Vacuum Filtration, Heat Drying and Incineration of Sewage Sludge in U.S.A.," by A. L. Genter and R. R. Kennedy, was presented in person by the latter.

This paper, a survey of the situation as it exists in the U. S., was introduced with a number of slides showing various types of filters, dryers, etc. The discussion on this paper plainly indicated that, so far as Britain is concerned, vacuum filtration, heat drying and incineration, except under exceptional circumstances, are unfeasible.

M. A. Kershaw, General Manager of the Colne Valley Sewerage Board, pointed out that so far as the sludge treatment and disposal problem was concerned there was still much to be done before a satisfactory solution was arrived at. He pointed out that in Britain considerable attention is paid to the financial implications of a sewage scheme, and that, indeed, sludge disposal schemes which make use of vacuum filtration and heat drying are looked upon with some disfavor, from this angle. He also pointed out that some very nasty liquors are produced from the process of vacuum filtration.

Mr. Griffiths, one time of Colne Valley Sewerage Board and now of Mogden (West Middlesex), said that vacuum filtered sludge does not dry very readily and that it is necessary to condition the sludge by removing "fines" to improve the drying characteristics. He also considered the reported performance of some of the U. S. vacuum filtration plants as comparatively poor!

During the course of discussion, which attracted a number of lay delegates such was the appeal of the subject, a certain amount of license was enjoyed by the speakers. One wanted to use sewage sludge, in the U. S., to "make the desert bloom as the rose." Another considered that any sewage engineer or operator who recommended burning sewage sludge should be shot out of hand.

AERATION CHANNELS under construction at Beckton works

Biochemical Reduction

An interesting and provocative paper on "The Application of Biochemical Reduction of Industrial Wastes" was presented by Dr. Vladimir Madera, Professor of Water Technology and Chemistry, Institute for Chemical Technology, Prague. In short, this was really a contribution on the anaerobic digestion of industrial effluents and aroused a considerable amount of discussion.

Dr. Madera said that the principle for the application of biochemical methods in the technology of waste water is to use aerobic methods for the treatment of sewage and industrial wastes, and anaerobic methods for sludge disposal. Allowing for certain exceptions, this rule may stand, for it is founded on many reasons. The aerobic process, oxidation by oxygen obtained from the atmosphere, is due to the action of both bacteria and protozoa. Integration of solids takes place. A part of the organic substances is decomposed and some of them mineralized: the other large part accumulates in flocs. This part having been separated either by secondary sedimentation or by segregation on the trickling filter material, only a relatively small residue of impurities remains in the liquid.

In the anaerobic process, solids are destroyed by reduction and oxidation without external sources of oxygen. Oxygen is supplied by the simultaneous reduction of solids (of the same or of another molecule). In emphasizing this difference between the anaerobiose and the aerobiose, mention is made of bio-chemical reduction and mean anaerobic destruction. The anaerobic process is due to bacteria and the organic matter is disaggregated. A great part of the decomposition products passes into solution, from which

it cannot easily be separated. A special treatment of supernatent liquor is necessary.

There are exceptions to this principle, these being that the anaerobic method is used for waste water treatment.

In addition to septic tanks (used in small installations because of their simple operation), there exist purification plants dealing by digestion with wastes of high concentration, equal or near to the usual solids concentration in sewage sludge. Anaerobic treatment has been applied or investigated and proposed for dealing with wastes from distilleries and yeast factories, packinghouses, dairies, beet-sugar processing, wool scouring, strawboard mills, manufacture of antibiotics, and other industries.

Dr. Watson, of Keighley, mentioned the classical researches by Buswell on the digestion of wastes. He spoke of his own septic process for wastes, the investigation into which process was carried out some years ago, and the reduction which could be achieved by such mechanisms. In a more critical vein he commented that some of the loadings given in the paper did not indicate very good performance, and that after this pretreatment at the source it was necessary to put the treated effluent into the sewer for final treatment at the sewage treatment plant.

Inspection Trip

As previously mentioned, the visit to the London County Council Northern Outfall Works, was a visit well worth while, for such was the organization that a tour of the plant which lasted no more than an hour left delegates ample time to revisit those sections in which they were particularly interested. During this free period the writer had a most interesting and informative chat with Dr. Rohde, of the German Ruhrverband, on the subject of multiple weirs in settling tanks—a subject on which Dr. Rohde speaks with considerable authority.

The L.C.C. scheme is, of course, a mammoth project, which when completed will surely give London the largest sewage treatment plant in the world. The vital statistics are as follows:

The London County Council's main drainage system serves an area of 180 square miles, a population of about 4,500,000, and 20,000 industrial undertakings! The whole of the sewage north of the River Thames flows to the Northern Outfall works at Beckton, and from south of the Thames, to the Southern Outfall works at Crossness, Erith.

DOUBLE-SIDED WEIR in new final settling tanks. Note brick lip.

The dryweather flow to the Northern Outfall works varies throughout the day from a rate of 60 to 300 mgd, with an average flow of about 200 mgd. The Southern Outfall works deals with about one-half this volume.

Since the war the L.C.C. has undertaken a very large development program, including construction of a temporary sludge digestion plant, completion of detritus tanks, and installation of screens and construction of sedimentation tanks to treat up to 300 mgd, and also the following works, all of which are in an advanced state of construction: a 60-mgd diffused air plant; a powerhouse, etc.; and a sludge digestion plant to digest the whole of the sludge produced at the works and estimated at 6,000 tons per day.

It will be recalled by some readers that the existing activated sludge plant at the Northern Outfall works, which was built in 1938, consists of a Hartley unit followed by re-aeration by diffused air. The Hartley aeration plant is a surface aeration unit, circulation being effected along channels 6 feet wide by 5 feet deep by means of 10-foot diameter paddles (see photograph). There are six sets of channels, each set consisting of two compartments, one above the other, interconnected at four points.

An outstanding feature of the L.C.C. job is the first-class quality of the concrete work being produced. A further feature is the use of a traveling shutter (form) being used to form the various walls in the diffused air plant.

An interesting point of design about the final settling tanks being constructed is the double-sided weir trough carried on cantilever supports from the walls of the tank to convey effluent away from the tank. This type of weir led many delegates to enter into discussion on the matter of weirs—a topical subject in Britain, where some study of the problem of settling tank design and efficiency is being undertaken by an authoritative body.

Can you beat that?! The clerk said that it would write 50,000 words—and here it had to run out of ink at a time like this.

Sewage treatment plant designers and operators should know about these advanced techniques for . . .

Conveying Flowable Materials

by LYNE S. METCALF, Technical Writer, New York, N. Y.

THE PROBLEMS of handling waste materials have long engaged the serious attention of the modern plants, and are widely considered as probably the most important phase of operations in which to reduce labor requirements, increase safety factors and cut costs.

A good many plants have found better systems to utilize the aids, devices and techniques available today for speeding up the movement of flowable materials. This has been the result of long research and practical engineering experience developed on the drawing boards, and on location, in conjunction with all kinds of plant operations involved.

These plants have discovered mechanical methods and procedures to cut handling costs; to increase output of present equipment; to provide for continuous processing; to reduce plant traffic and confusion; to protect from contamination; to eliminate employee health hazards; to control fumes, odors, dust, moisture—and to convey materials safely.

Concept of Modular Unit

In considering modern installations of handling equipment for flowable materials of any type, it is the concensus of opinion that management should start with the idea that this step in operational improvements must be considered in the light of much more than the mere replacement of a few workers here and there with a piece of mechanical equipment.

The study of the handling of such materials in quantity must start with the inception of a modular unit all the way from the production and processing lines to the packing point, to the storage area and to the carrier.

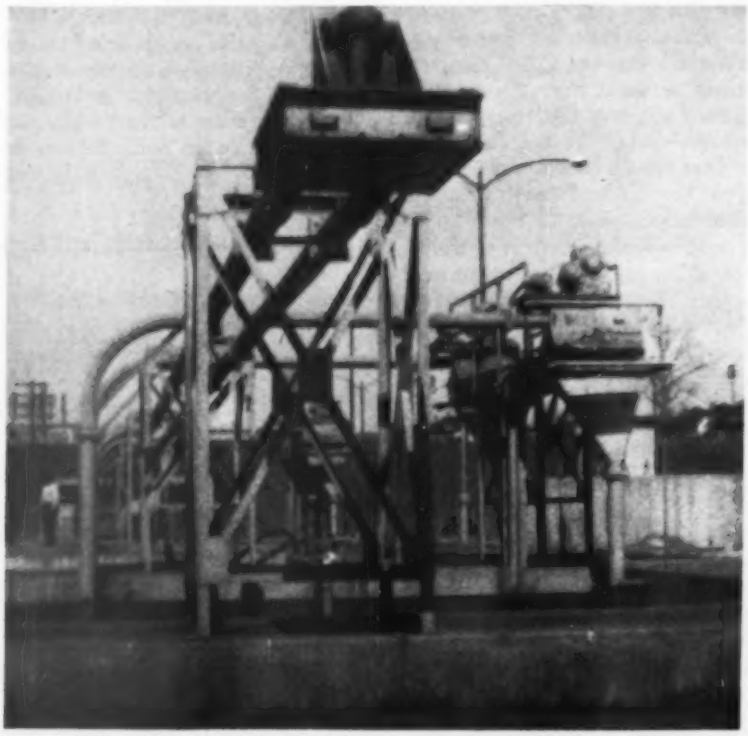
These progressive preliminary steps leading to distribution of the finished product to the market must be taken by management with the highest degree of speed and efficiency, in which the conveying phase must perform its task with precision equal to every other operation.

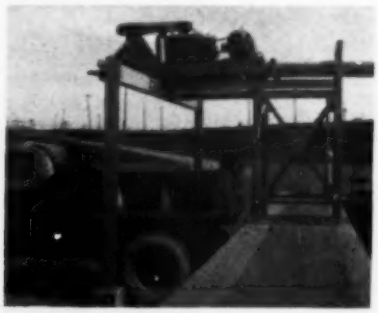
An analysis and evaluation of this modern type of plant operation reveals a comprehensive picture of conveyor requirements for handling flowable materials. It will be summarized in the succeeding paragraphs and will be found well worth study as groundwork for specifications in connection with any plant improvement or modernization which may be contemplated by the reader.

Flexibility and Versatility

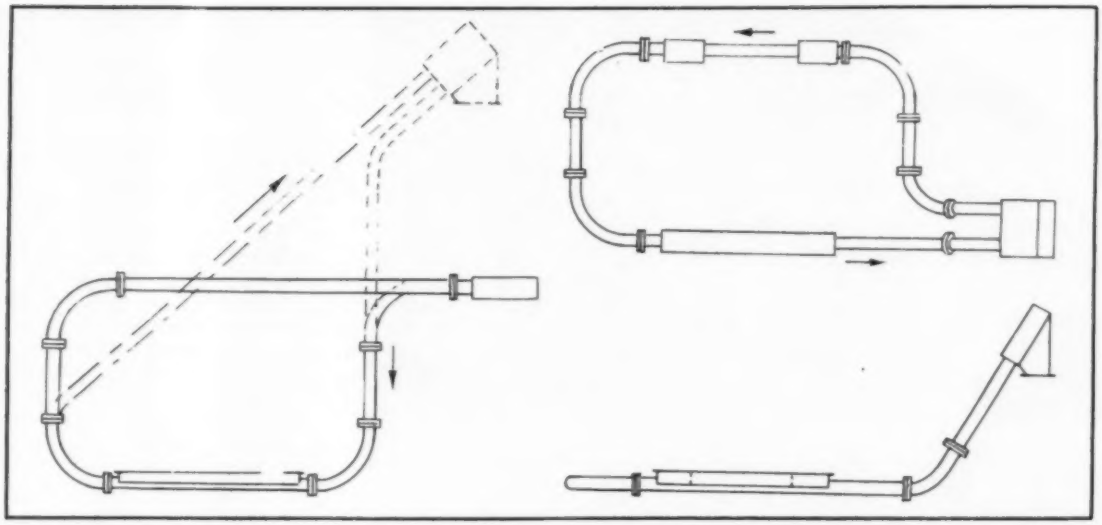
In all conveying of any kind of flowable material, flexibility in direction is of prime importance. Change in direction of conveying should be a part of the movement, without the necessity of transferring from one conveyor to another. A single conveyor should be able to operate in more than one plane without transfer points. Roller turns should be provided to make rolling friction available for any abrupt clearance turns which are required, and particularly is this true for extremely abrasive materials.

Also, provision in any conveying system should be made for the possible future extension of the system by a single addition.





COMPLETE grit removed system at Birmingham, Ala. sewage works consists of five Hapman tubular conveyors. Four are square loop conveyors which remove grit from grit chambers and deposit it in a parallel circuit header. The header conveyor discharges the grit into dump truck as shown at right.



DIAGRAMS of two tubular conveyor systems. Left—Square-loop circuit with off-set elevated discharge. Right—Horizontal run-around with multiple receiving hoppers and elevated discharge.

Some of the conveyors in use today have the ability to handle a wide range of materials, such as abrasive, corrosive, semi-solids and food products without contamination.

In some, different materials may be handled in the same conveyor without contamination due to the self-cleaning characteristics of the conveyor. Another factor to look for is minimum particle breakage and the ability to convey without product segregation by particular size.

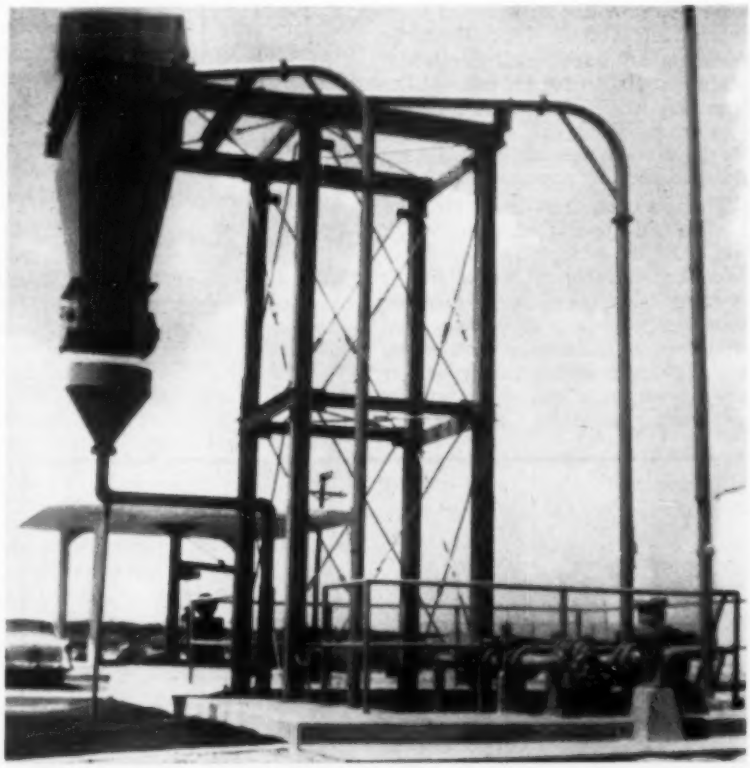
There should be versatility in handling, through the provision of multiple receiving and discharge points. Another important requirement in certain types of conveying is the ability of the equipment to allow automatic filling of a series of bins without gates (i.e., choke feed). A check also should be made of the presence or absence of ease of cooling or heating, internally or externally. Likewise the ability to deliquefy and the ability to pump. In addition, if needed, the conveyor system may have to assure adjustment to a wide range of temperature conditions.

Another versatile function which may be required is the matter of recirculation, i.e., the mechanical ability to return unused material to the original feeding point. It may be necessary to utilize conveyor systems with a wide range of materials for flight construction to suit plant requirements. And, the question of whether a conveyor can handle both carry and return runs. It may be necessary in some instances to increase capacity and if so, the question of adaptability to simple changing of the drive should be looked into.

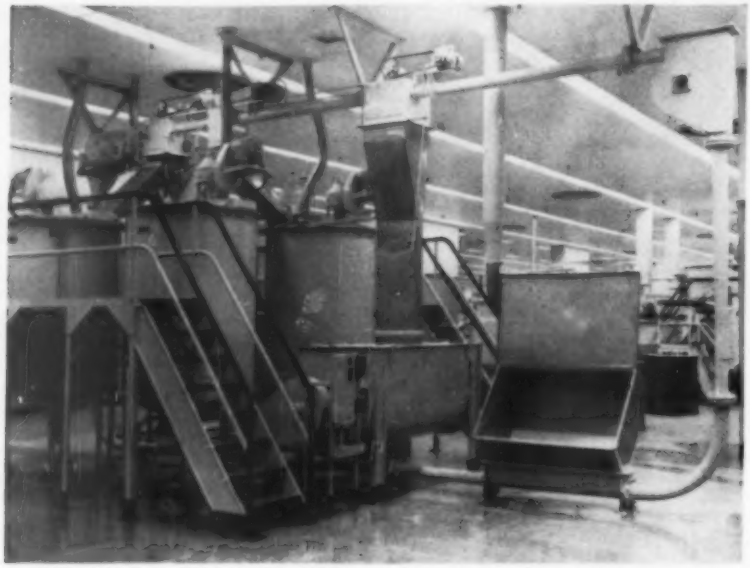
Then, there is also the capacity of certain installations to convey into or out of, or process through pressure or vacuum zones with pneumatic controls. Also accurate volumetric control (for feeding), all of which the modern conveyor manufacturer can engineer to meet customer's specific problems. (For example, conveyors can be equipped with noiseless vibrators to insure positive discharge of materials, and many other technical devices are also to be had.)

Aim of Modern Design

Some conveyors are of the totally enclosed type. They resist explosion,



GRIT is moved by tubular conveyor from grit chamber to outside loading hopper at St. Peterburg, Fla. sewage treatment plant. Hopper discharges grit into truck.



TUBULAR conveyors are used to convey lime, alum and ferric sulfate in water and waste treatment plants.

and will test to suppress flame. Odor control, dust and vapor tightness are elements which may have to be considered and rigidly required.

Some of the other musts in considering these installations, is that the conveyor should have faculties of self-cleaning. Also ease of supporting and versatile installation features and minimum structural steel. There should be minimum clearance requirements and minimum pits needed for railroad car unloading. There is no need for ugliness either, in this kind of equipment. Much of it in use today is of very neat and pleasing appearance.

The aim of modern design is found in a tubular type of conveyor which also aims to achieve the lowest requirement possible. Another aim is to effect quiet operation to dispense with special feeding equipment—and to assure a continuous distributing discharge over large bins wherever this is a necessary part of the product operation. Naturally, low general maintenance costs should be present in any installation.

Maintenance

Regarding this important matter of upkeep, there are tubular conveyors in use which require only as few as one or two lubrication points. Where standard pipe is used it allows very easy replacement of flanged pipe. Systems are available which require no lubrication whatsoever on the conveyor chain. Another advantage may be found in straight pipe sections where maximum life can be achieved by rotating them from time to time.

The Tubular Conveyor

What the present modern tubular conveyors look like and how they work is very instructive. Basically such a conveyor consists of a series of solid circular flights or discs, mounted at intervals on a sealed pin chain.

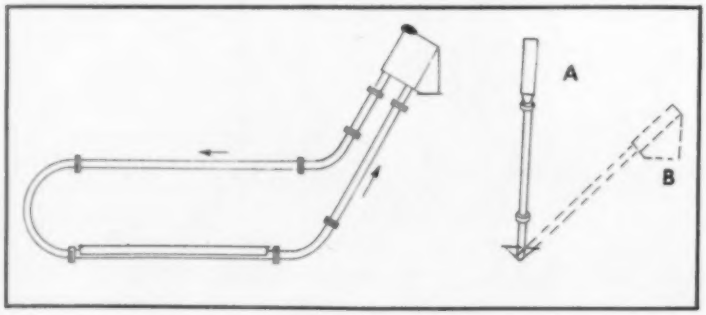


DIAGRAM of vertical circuit with receiving hopper on bottom section, and elevated discharge.

This assembly works within a tubular casing and is driven by a special sprocket engaged with a drive "box". The continuous operation of the endless chain assembly through the enclosed tubular casing lets the material be conveyed from various receiving or discharge points.

The chain itself comprises an assembly of aids and center links—connected by pins with neoprene washers. These washers are assembled under compression between the parts of the linkage. The purpose of this is to prevent material particles being conveyed from contact with the pins and thus causing wear. The pins themselves must be hardened to assure longer life.

Modern conveyor engineering today enlists many features in designing systems to meet any and all special conditions. Only a few can be covered. For instance, in some cases the flights consist of magnesium, bronze, stainless steel, plastics or cast iron instead of neoprene to meet special local conditions. Also sometimes neoprene flights are bonded to, or bolted between steel back up attachments to form a solid disc.

On an average, the flights have an area about equal to 80 per cent of the sectional area of the tubular casing. Flights are mounted eccentrically on the chain, so that, as the chain moves through the conveyor pathway, it twists through the pipe—the "heel" of the flight in contact with the "bends".

As a rule, this type of conveyor operates in pipes ranging from 2 inches to 12 inches in diameter. These conveyors are designed to move at speeds of from one foot per minute to over 100 feet per minute. They can handle "pilot" range up to 40 tons per hour.

This type of conveyor can operate on more than one plane which is considered a great advantage among designers. As to power requirements, it has been pointed out that comparatively low horsepower is needed in operation through the use of selected gear reducers. Only the drive motor requires lubrication and neither the internal part of the conveyor or the chain has oiling points. Inspection openings are provided to check on chains and inner operation.

Lynn J. Riege, of Hapman Conveyors, Inc., pioneers in the development of conveyors, has said to this writer:

"Leading companies are maintaining their position in the front rank of American Industry by adhering to a doctrine which has been long acknowledged in every successful factory. This simply means taking ad-

vantage of new ideas and new machines as they are developed—even though further improvements may be available sometime in the future.

"Progress is only made by, first logically evaluating the effects of a system and the improvement procedures, and then moving into it and getting the thing done. No one can predict every engineering hope in advance, nor can they wait for it in the economic present. When the current improvements available in new mechanical efficiency are effected, such a company that has taken the immediate step will always be in a better position to incorporate future new devices into its system than those which have postponed any revision of outmoded operational production practices.

"The progressive materials-handling-conscious man is continually searching for better materials and handling methods in the overall function of distribution of materials, to eliminate waste motion and consolidate activities for a smooth flow of material and relief of bottlenecks.

"It is this urge to do the job better, to get materials and things from where they are to where they are wanted or needed—and to do it rapidly, safely and with economy, that has spurred engineering organizations to make even greater advances than anticipated in so greatly improving the techniques in this function of conveying. There can be no question but that the manner and method of flowable materials handling is the one vital place, in plants requiring improvement of this operation, which offers sound and substantial opportunities for cost cutting and other operational savings."

The adoption of these modern techniques of conveying flowable materials to water and sewage plant operations has begun. The accompanying photographs show how this has been done.

N.J.S. & I.W.A. Schedules Industrial Wastes Papers

The New Jersey Sewage & Industrial Wastes Associations, has announced that it will devote Wednesday, Mar. 12, 1958 entirely to industrial waste problems. This is the first day of Associations' meeting to be held March 12-14, 1958 in Atlantic City.

The morning session, to be moderated by James C. Lamb, American Cyanamid, will be on Neutralization of Acidic Wastes and will present the following papers: "Selection, Preparation and Application of Materials" by Gordon J. Wiest, Warners Lime Co., "Problems of Process Control" by Bruce W. Dickerson, Hercules Powder Co., "Design of Neutralization Units," by John J. Baffa, Consulting Engineer, "Sludge Handling and other Problems," by J. H. Morris, Merck & Co.

The afternoon session will be moderated by A. E. Griffin, Wallace & Tiernan, and will present papers on: "Basis for State and Interstate Regulations on Discharge of Industrial Wastes," Robert S. Shaw, N. J. State Dept. of Health, "Treatment of Cyanide Wastes," A. E. Griffin & R. J. Bakde, W&T, "Information Required for Disposal of Chemical Industry Wastes," Robert W. Haywood, Jr., San. Engr., E. I. DuPont, and "Pollution Abatement an Inevitable Companion of Water Conservation."

The program for Thursday and Friday, Mar. 13-14, lists the following papers:

Thursday, Mar. 13, A.M., Short Time B.O.D. Testing, Dr. H. E. Orford, Rutgers Univ.; Bergen County Sewage Authority, H. Zablatsky, Chief Operator; Atlantic City Sewage Company Plant, George Fieldhouse; Merchantville Sewage Plant, Raymond G. Case; and Berkely Heights Sewage Plant, Peter Homack.

Thursday, Mar. 13, P.M., Financing and Bonding of Sewage Plants, Richard Walsh; A New Concept in Sewer Pipe Classification, Johns Manville Co.; Metering of Sewage and Industrial Wastes, George Walker; Scheme of Analysis of Iron, Chromium, Copper and Nickel Metals by Photometric Methods.

Friday, Mar. 14, Breakfast meeting, Panel Discussion, "Responsibilities of Sewage and Industrial Waste Plant Operators," Sponsored by the State Department Representative.

Nebraska S. & I.W.A. Holds Sixth Annual Meeting

Nebraska Sewage and Industrial Wastes Association held it's sixth annual meeting in November at the Clarke Hotel, Hastings, Nebraska.

There were 61 men registered for the meeting, 20 wives also attended, and a total of 92 people attended the banquet. Lloyd L. Thomas, Grand Island, was elected president, Floyd Sanks, Sidney, Vice President, and V. J. Lechtenberg, Omaha, Secy-Treasurer. It has been since noted that Mr. Thomas, President, passed away unexpectedly on Nov. 25, and Floyd Sanks is now automatically president.

The meeting also appointed two committees. The first is to study the possibilities of sewage treatment plant operators certification in Nebraska and the second is to study the power consumption at sewage treatment plants.

Data on Engineers Compensation in Pennsylvania Available

Mr. Walter A. Lyon, Chairman, Committee on Salaries, Pennsylvania, Dept. of Health, Division of Sanitary Engineering, has announced that Sections II, III and IV, of the reports of the committee on salaries, from the Conference of Municipal Public Health Engineers is now available.

CORRECTION

Page 561, Dec. 1957 Issue

Dr. E. R. Herman, Industrial Hygiene Engr., Humble Oil Co., has called our attention to the fact that he had been misquoted in the report on his paper "Stabilization Ponds," presented at the FSIWA Meeting in October, 1957.

The report quoted Dr. Herman (Para. 2, Col. 3) as stating: "The depth of such ponds should be determined from the Beer-Lambert Law $d = \text{Log } I_o\ I_e \div kc$ where I_e is the intensity of light, etc."

The Beer-Lambert Law as given above is incorrect, and Dr. Herman stated that he did not want to leave the impression that the pond depth should be calculated from either this form or the correct form of the equation.

Dr. Herman states that the type of waste stabilization pond which he was discussing should be designed and operated according to a formula for volume, $V = 5.37 \times 10^{-8}\ Nqy\ [1.072^{(35-T)}]$ in which temperature T is obviously the most influential factor, and at depths between 2.0 and 3.5 ft.

We wish to thank Dr. Herman for bringing this error to our attention.

For sanitary engineer designers working on sewer projects, a helpful tool is a . . .

Sewer Design Slide Rule

Developed and patented by IRVING GOLDFEIN, Research Engineer, Bureau of Sewers, Milwaukee, Wis., the slide rule is available at a nominal price from the author.

DURING THE PERIOD of World War II (1941-1945), it was concluded that after the war there would be an upsurge and tremendously increased activity in the design and construction of additional sanitary facilities throughout the United States, and that the programs would, of course, include sanitary, storm, and combined sewers.

Curves and nomographs were then available for the design of sewers, but they are not as flexible as a slide rule. The author then undertook the development of such a slide rule for the engineering profession and for college students studying sewer design. The specifications laid down were that it must be handy, fit into an ordinary brief case, and be inexpensive.

Before releasing the sewer design slide rule in December 1946, more than 100 sewer designs were made with it, and checked against the Kutter formula and available sewer design curves and nomographs in order to be certain that it was correct in all respects.

Description of the Rule

The sewer design slide rule here described has a wide range, is of handy size, simple to operate, accurate, and rapid in the solution of sewer design problems. It is 3¼ inches wide by 13 inches long, and consists of a rule and slide made of 6-ply, tough check, and a cellulose acetate runner with hairlines.

The device is based on the Chezy formula, $V = C\,R\,S$, with Kutter's formula being used to determine the value of C. It applies to circular sewers only, and includes scales for:

1. Q, 0.25 to 2,000 cfs.
2. Parts full, 0.1 to 1.0.
3. L, 10 to 3,000 ft length.
4. H, 0.01 to 40 ft drop.
5. V, 0.5 to 50 ft per sec.
6. $N = 0.015$ coefficient of friction.
7. $N = 0.013$ coefficient of friction.
8. $N = 0.011$ coefficient of friction.
9. D, 6 to 216 in. diameters.
10. T, 0.1 to 10 minutes.

Correct positions on the scales are worked out for the coefficients of friction $N = 0.015$, $N = 0.013$, and $N = 0.011$. Different coefficients may be proportionately interpolated.

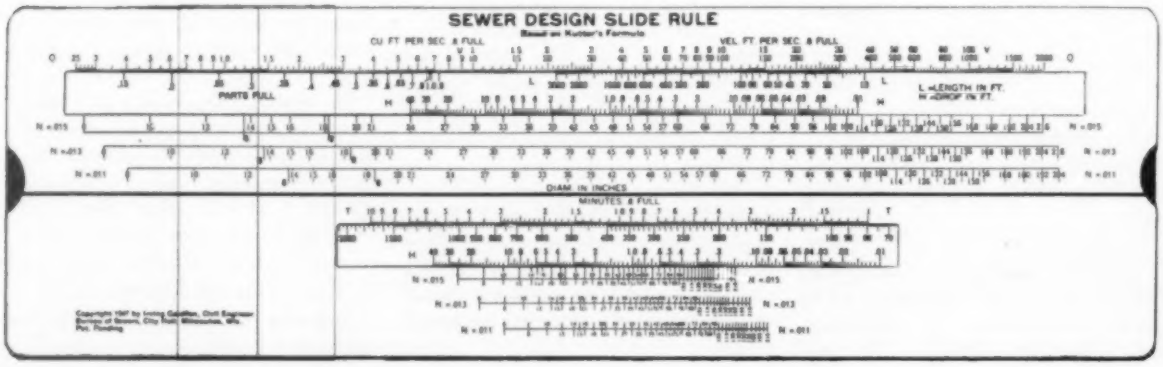
The back side of the device has instructions for use through the solution of three typical sewer design problems worked out in detail, and a standard engineer's slide rule.

Use of the Rule

A quantity of 100 cfs is to be discharged through a sewer 700 ft long, whose coefficient of friction is 0.015. If 700 on the upper L scale is set under the required quantity, 100, on the cfs scale, the different drops required by various sizes of sewers may be read off on the upper H scale over the divisions corresponding to the sizes on the line $N = 0.015$. If N is assumed to be 0.013, the rule would be set as before, but the required drop would be read on the upper H scale over the division on the line $N = 0.013$. It will be seen by the form of the rule that any coefficient may be interpolated by eye by drawing lines connecting the corresponding divisions on $N = 0.013$ and $N = 0.015$ and also a horizontal line at a proportional distance between the other coefficient lines. By using the runner to project the intersections to the upper H scale, the rule is read as before.

Suppose the sewer is already established and the velocity and time of running are wanted. The method of procedure is as follows: Find the drop of the sewer on the lower H scale and set it over the division corresponding to the size on the line representing the assumed coefficient of friction. The time in minutes may then be read on the T scale over the division corresponding to the length on the lower L scale. With the same setting, the velocity in feet per second may be read by looking over the length on the upper L scale and dividing the reading by 10, as indicated by the supplementary red figures over the Q scale.

The scales are adjusted for the sewer running 0.8 full, a point where the velocity is practically the greatest and the discharge 0.98 of the discharge running full, thus providing for a maximum rapidity of collection with a margin of carrying capacity. A "parts full" scale is provided for converting the discharge for other depths of flow on the upper scales, and a similar scale for converting the time and velocity on the lower scales of the rule.


SEWER DESIGN SLIDE RULE
CU FT PER SEC. & FULL
VEL FT PER SEC. & FULL
PARTS FULL
L =LENGTH IN FT.
H =DROP IN FT.
DIAM. IN INCHES
MINUTES & FULL

Meeting in Seattle in November drew record attendance of 325 to hear papers on . . .

Sewers and Infiltration *among other topics*

A Report by GILBERT H. DUNSTAN, Professor of Sanitary Engineering at Washington State University, Pullman, Wash.

EDITOR'S NOTE: Prof. Dunstan, who is Secy.-Treas. of the Pac. N.W.S.I.W.A. gives a brief abstract of each of seven papers and two panel discussions and reports on business conducted at the meeting. Four papers dealt with industrial waste topics; a brief report on these will be included in the March issue of *Industrial Wastes*.

■ "JOINTING PROCEDURES FOR SANITARY SEWERS" were discussed by L. L. Sphar, Engr.—Mgr., Concrete Products Assn. of Washington, who gave the basic purpose of sewer pipe joints; to wit: "To keep sewage inside and groundwater out. They must be able to flex and accommodate pipe movement. Some joints may be superior with respect to one or another of the functions, but the relative importance of these varies from project to project. The engineer should seek all available information regarding the good and bad qualities of the various joints, and ask for demonstrations from the suppliers for types he is not familiar with. He pointed out that there have been difficulties with some of the newer joint materials, but generally these were due to inexperience on the part of the workmen, and have been overcome. He then described the various jointing types that have been used in the Pacific Northwest, many of which were illustrated with slides.

"BEDDING AND BACKFILL REQUIREMENTS FOR PROPER INSTALLATION OF SEWERS" were set forth by J. M. Thomas, Div. Sales Engr., Armco, Portland, Ore. There is a need for more efficient and economical sewers; this is obvious from the trouble and expense involved in major sewer failures. A sewer system should be designed and constructed so as to be structurally sound and function efficiently during the entire life of the conduit. Most sewer failures have been due to structural weaknesses rather than to improper material design. Each type of pipe material has its own bedding and backfill requirements, and the engineer should design the pipe to carry the load under these conditions. Although sometimes specifications have been impractical or not clear, the impression is that most cases of failure have occurred due to improper installation and construction. The great need appears to be a more accurate execution of the installation specifications.

"INFILTRATION," a detailed report was submitted by Lloyd R. Clark, Chairman of the Committee on Infiltration. Mr. Clark is a partner, Clark & Groff Engineer, Salem, Ore. The report was based upon questionnaires circulated in the Northwest. Thirty-eight cities and sanitary districts were represented in the report and a total of 130 leakage tests on sewers were received. Eighty per cent of the tests measured infiltration while the remainder measured exfiltration. Pressure heads varied from 2 feet to as high as 50 feet, with 4 feet as the median. Leakage tests were reported on all sizes of sewers from 6 to 60 inches in diameter. The total length of sewers covered was about 300 miles. The number of tests on pipes with various types of joints was insufficient to permit generalization, although it appeared the rubber gasket joint is capable of reducing infiltration to low or even insignificant flows. One revealing outcome of the questionnaire is the tremendous inflow into existing and old sewers, with roughly one-third exceeding allowable limits by as much as 50 times.

Federal Pollution Control

THE FEDERAL WATER POLLUTION CONTROL PROGRAM," and its progress in the past year was described by Herbert C. Clare and Robert L. McGrath, U. S. Public Health Service, Portland, Ore. Many agencies have responsibilities in the field of water resources, including the U. S. Public Health Service. The enactment of Public Law 660 by the 84th congress assured that the Federal Government would continue its leadership in the field of water pollution control, but reaffirmed the policy of protecting the primary responsibilities and rights of the states in preventing and controlling water pollution. The act provides for the collection and dissemination of basic data relative to water quality, and a construction grants program. As of September 30, 1957, a total of 41 projects in the Pacific Northwest were approved in the first nine months of the year, with a chance that about twenty more will be approved by the end of the year. This represents a rate of approximately 60 projects per year, whereas during the past four calendar years, the average number of projects constructed annually in these three states was 37. Both the number and dollar values of projects appears to have increased substantially under the grant assistance program.

Water Quality Criteria

"THE GREEN-DUWAMISH RIVER—A REVIEW OF FOUR CRITICAL WATER QUALITY CRITERIA," presented by Robert W. Okey, Engineer, Howard T. Harstad & Associates, Seattle, Wash., had two purposes: To determine the extent of biochemical and physical degradation of the stream, and to determine, if possible, the effect

of projected industrial expansion on the stream, and from this to determine data needed for present and future waste disposal requirements. This study considered four factors from upstream of any measurable pollution load down to the point of discharge of the stream into Puget Sound. These factors were dissolved oxygen, water temperatures, hydrogen ion concentration and chlorides. It was concluded that summer temperatures were high enough to indicate the need for further study. The storage and outflow pattern proposed by the United States Corps of Engineers does not provide sufficient flow during minimum periods. An increase in sewage treatment requirements or the development of trunk sewers to keep flow from the river is indicated in order to take care of future increases in sewage flow. It will be necessary to coordinate sewage treatment requirements with the granting of water rights.

Industrial Wastes in City Sewers

"How the Operator or the City May Control Industrial Waste Discharges in Municipal Sewers": a panel discussion. Panelists were George Hansen, Washington Pollution Control Commission engineer; C. S. Seabrook, city engineer, Puyallup, Wash.; and Dr. Ernest Campbell, Bureau of Governmental Research, University of Washington, Seattle. Dr. Campbell reviewed the legal aspects of the problems, included suggestions as to what an adequate ordinance should contain, and emphasized the need for being specific, so that all concerned will know exactly what may be discharged into the city sewers and what may be excluded. If pre-treatment is involved, it should be spelled out in detail. In all cases, the city and industries should make every effort to reach an understanding through mutual discussion and cooperation, rather than for the cities to attempt to exercise their police powers unduly to abate industrial waste situations as nuisances.

"Value of Laboratory Tests and Records to the Operator and the Public" by Robert E. Leaver, Senior Public Health Engineer, Washington Department of Health asked two questions: "How many operators are making maximum use of laboratory work and records?" and "Do operators occasionally sit down and summarize their reports to determine if they have additional information and lessons that are not self-evident from the day to day operation?" These questions were answered by reference to a particular plant, which was considered to be well operated.

"High Rate Digestion" is an inaccurate term according to Kenneth V. Hill, partner, Greeley and Hansen, Engineers, Chicago. He pointed out that in connection with sludge digestion tank operation there is no indication that the rate of digestion is different in "high rate" tanks than that occurring in most earlier installations. The major accomplishment has been to promote more uniform environmental conditions of feeding and temperature and better utilization of digester volumes. Examples were presented of loadings amounting to 7.5 to 9.5 pounds of suspended solids per cubic foot of digestion tank capacity per month. All except one of the plants used thickened sludge. Tanks should be carefully designed, and should include provision for effective mixing devices. The use of nutrients in the case of some sludges may be desirable.

"The Operator's View of Plant Operation and Design" was presented by William H. Newell, Supt., Eugene, Ore. The operator frequently has complaints which should be made available to the designer, once the operator is certain that he has a valid reason for finding fault, and is not just trying to get out of doing his job. The engineer may have had to satisfy conditions unknown to the operator, or he may not be aware of the difficulties resulting from the use of certain types of equipment or designs. Many examples were cited. It was suggested that the designer should be certain that the municipal officials be fully informed as to the needs for competent operation and adequate maintenance, including the provisions of the necessary tools.

Association Business

R. Trumbull Smith, Seattle, Washington, was elected President; Marvin W. Runyan, Portland, Oregon, Vice-president; and Gilbert H. Dustan, Pullman, Washington, was re-elected Secretary-treasurer.

Ralph E. Fuhrman, Executive Secretary, FSIWA, presented the various awards: Andrew J. Wahl, retiring president of the association was named 1957 recipient of the first Hatfield award for outstanding performance in the operations field. Wahl is superintendent at Boise, Idaho. The Bedell award for outstanding service to the association was presented to Robert O. Sylvester, professor of sanitary engineering, University of Washington.

Ten awards for outstanding sewage plant operation reports were made; first place winners in each of three population groups were:

Lyman Ketcham, Tacoma plant operator, cities over 25,000; W. E. Loftin, Gresham, Oregon, cities of 5,000 to 25,000; and Vern Young, Franklin-Pierce High School, near Tacoma, serving less than 5,000 population. Ketcham also won the top award last year.

OFFICERS of Pacific N. W. Sew. & Ind. Waste Assn. include (front row left to right): Andrew J. Wahl, Past President; R. Trumbull Smith, President; Gilbert H. Dunstan, Secy.-Treas. In the back row are: Dr. Ralph E. Fuhrman, Exec. Secy., FSIWA; Emil C. Jensen, Past Pres., FSIWA; H. Loren Thompson, Director to FSIWA from Pac. N. W. Assn. and Marvin W. Runyan, Vice Pres., Pac. NWSIWA.

Meeting in Indianapolis takes preliminary steps to affiliate with the Federation as an association separate from the Central States organization also hears about . . .

Blower Maintenance, *aeration, sludge digestion*

A report by DON E. BLOODGOOD, Prof. of Sanitary Engineering at Purdue University, West Lafayette, Ind., and Editor of Industrial Wastes.

■ OF PARTICULAR INTEREST to sewage works operators in Indiana, the Central States Sew. & Ind. Waste Assn. and The Federation was the action taken by The Indiana Sewage & Industrial Waste Assn. Nov. 13 and 14. Two petitions were circulated and signed by the 160 registrants; The first to be presented to the Federation asking permission to become affiliated; The second asking for release from the Central States Sewage and Industrial Waste Association. Expressions of those present indicated that they felt that the new association can better serve those in the state who are interested in sewage plant operation.

The Indiana association also established the mechanism for voluntary licensing of sewage plant operators. This activity is soon to get under way.

Blower Maintenance

"THE SELECTION, CARE, AND MAINTENANCE OF BLOWERS" by G. R. Kunze, Chief Application Engineer, Roots-Connersville Blower Co., Connersville, Md.—Good design suggests that multiple blowers be used in all installations. Positive displacement blowers with a capacity of 21,000 cubic feet per number is an economical size to use. V-belt drives are possible for positive displacement blowers because of the relatively slow speeds at which these blowers are operated. The starting valve (relief valve) must be used and the exhaust from this valve should be vented to the blower room or the outside of the building. If the exhaust is piped to the inlet of the blower there may be a circulation of hot air that may be injurious to the blower. Pulsation snubbers are necessary to cut down on the noise of larger positive displacement blowers.

Characteristics of centrifugal blowers are:

1. It is a constant pressure machine.
2. The pressure developed varies with inlet air density.
3. The delivered volume varies with the pressure.
4. Operation near or below the "surge" point can result in damage to the equipment.

A blower when received on the job should be handled as if it were a sensitive piece of machinery. It should be stored in a clean even-temperature area. Proper alignment of driver and blower should be done carefully and should be as nearly perfect as possible. It may be necessary to place a temporary screen in the inlet line to collect any articles that may have been left in the intake when it was being installed.

A good maintenance program is essential and should include the following checks:

1. Lubrication, oil pressure, temperature and leaks.
2. Discharge pressure.
3. Inlet pressure (pressure loss through air filters).
4. Unusual noises or behavior.

It is necessary to select carefully the coupling between the driver and the blower when they both have pulsations.

Air Diffusion Techniques

A panel discussion on Aeration was presided over by Prof. C. H. Teletzke of Purdue University.

Participants were: J. Duncan McKeowin, Carborundum Co., Cincinnati, Ohio; Miles Lamb, Chicago Pump Co., Chicago, Illinois; R. G. McDonald, Filtros, Inc., East Rochester, New York; N. C. Burbank, Infilco, Inc., Tucson, Arizona; Carl D. Wright, Pacific Flush Tank Co., Chicago, Ill.; John R. Sperry, Walker Process Equip., Inc., Aurora, Illinois; and William L. Berk, Yeomans Brothers Co., Chicago, Ill.

Mr. McKeowin: It will take a time test to determine the superiority of certain air diffusion media. Diffuser clogging is the great concern in the use of porous media for air diffusion. Porous media have been used for forty years. The increased use of tubes over the past thirty years has been an indication of their acceptance for the aeration of sewage.

Miles Lamb: The average loading of the standard activated sludge plant is 25 to 30 pounds of B.O.D. per 1000 cubic feet of aeration tank volume. There is need for wide band air application in order to obtain maximum efficiency in air application. Professor Morgan's work at Iowa Univ. showed that diffusers can be clogged externally and internally. The external clogging can result from fine sand and calcium carbonate. Clogging 0.1 mg of dirt per 1000 cubic feet of air. Bag cleaners are suitable and will produce clean air with .04 mg of dirt per 1000 cubic feet.

R. C. McDonald: Filtros plates placed in aeration tanks in 1926 are still in use. A new plate is being developed that is made up of quartz sand and phenolic resin. The new plan at Chicago calls for the placing of the plate holders at right angles to the length of the tank.

Dr. N. C. Burbank: Flexing aeration medium and the rotor mixing may be used to obtain the aeration needed. Extremely high B.O.D. loadings have been taken care of by the rotor aeration method.

Carl D. Wright: The Kraus process consists of adding 50 per cent of the air at the bottom of tanks through diffuser plates and at least 50 per cent of the air at five feet under the water surface. The upper air is discharged down in counter flow to the diffused air.

John R. Sperry: A high rate of tank turnover is important. He has failed to find a core in an aeration tank that is receiving air from a sparging device.

William L. Berk: Discussed the mechanical aeration unit and the Yeoman's Cavitator.

Sludge Digestion

Prof. Phillip Morgan, University of Iowa, talked on "UTILIZATION OF DIGESTION TANK CAPACITY." The problem of operation of digestion tanks is the greatest of any in the sewage treatment plant. A good design, if not properly operated, can result in failure. A poor design, if operated reasonably, may be successful. The bacteria in a digestion tank gets almost as rich a diet as that used by humans. Proteins make up a portion of primary sludge and they are made up of large molecules. The bacteria have to break up the molecules into substances that can be used by bacteria. Acetic acid is one of the end products and when it is broken down it becomes carbon dioxide and methane. Except for the past ten years research has been largely on the batch basis. In recent years the work has been directed toward studying the process of digestion under constant loading.

Thermophilic digestion is being done at Los Angeles; odors are developing and create a problem.

Digestion time required for sludge digestion is a debatable question. The maximum gas production occurs at 3 to 5 hours after addition of raw sludge. He recommends two tanks, one a biological decomposer, one a thickening or separation tank. This means keeping one tank in vigorous gas production all of the time and never discontinuing the feeding of it to let it rest.

Other Papers

"GAS EQUIPMENT MAINTENANCE." Carl Wright, Asst. Sales Mgr., Pacific Flush Tank Co., stressed that gas from the digestion of sewage sludge in a hot tank contains considerable moisture that must be removed from the gas collecting pipes.

The gas release mechanism may become clogged from accumulations of moisture and corrosion products. The piping must all be sloped to drain.

The low pressure check valve should be maintained by using neatsfoot oil on the diaphragm.

Robert Heider, Director, Division of Sanitary Engineering, Indiana State Board of Health, in a "Report of 1957 Legislation" said that the Indiana Stream Pollution Control Board was charged, by new legislation, with the responsibility of controlling the pollution of underground waters. A second law enacted permits the acquisition of land by condemnation proceedings for the construction of facilities for the treatment of industrial wastes.

Oral H. Hert, Sanitary Engineer, Indiana State Board of Health, discussed the use that has been made of federal grants in the building of sewage facilities. In Indiana there are more projects ready to go than there is money ready to assist them. The interest rate in Indiana for 1957 bonds sold is 4.93%. Only one city in Indiana (Newcastle) has undertaken construction without federal aid.

William E. Ross, Superintendent of the Richmond, Indiana Sanitary District, described the work of the State Committee on Sewage Plant Operator Certification. Certification has been considered for a great many years. Demands for Home Rule in Indiana have deterred any efforts to obtain certification of sewage plant operators.

W. F. Middleton, Consulting Engineer, South Bend, discussed "Trickling Filter Design for the Indiana Toll Road" and said that there are great variations in loadings of waste treatment facilities.

The digested sludge is hauled by tank truck and disposed of on grass areas on the turnpike.

Samuel Paradiso, Assistant Manager of Engineering Maintenance Department, Eli Lilly and Company, presented a paper, "Waste Treatment Facilities at the Tippecanoe Laboratories." The plant was located because of the availability of water for processing and reception of treated waste waters. The wastes are the result of the manufacture of antibiotics. The pharmaceutical manufacturing industry is always changing its products.

In the treatment of spent beers the wastes are neutralized so that the wastes are less acid. Aeration follows neutralization prior to clarification or digestion. The wastes from the primary settling tanks are pumped to high rate trickling filters with some recycling practiced. The primary and secondary sludges go to the digestion tanks. Some of the supernatant goes to nitrification tanks after which it is fed into the aerated waste.

The problems encountered in the operation of the treatment plant have been:

1. High BOD loads.
2. High suspended solids loads.
3. Irregular and excessive hydraulic loads.
4. Grease
5. Color.
6. Odor.
7. Corrosion.

Officers of the Indiana association who were elected to serve for 1958 or until affiliation with the Federation are: Ronald Kronewitter, Mishawaka, President; Gordon Dickerson, Connersville, Vice President South Section; Gordon Johnson, Gary, Vice President North Section; Frank D. Wraight, Indianapolis, Secretary; and Oral Hert, Indianapolis, Treasurer.

Our New Editor

■ THE SCRANTON PUBLISHING CO., INC. is pleased to announce that on Jan. 1, 1958, Dr. George E. Symons became the Editor of *Water & Sewage Works* just as had been planned when Linn Enslow dated his own retirement for Feb. 1958.* Prior to assuming the editorship, Dr. Symons had been Executive Vice President and Editorial Director of the Scranton Publishing Co., Inc. since Dec. 1956, in which position he had been especially concerned with editorial policy and production of this magazine as well as *Industrial Wastes* and *Modern Highways*. He will continue to function in that capacity in the corporation.

As Editor of *Water & Sewage Works*, Dr. Symons will not only be responsible for editorial policy and programs but he will also continue to edit the annual Reference & Data Number, which he has been doing for the past four years, and he will continue to write his informative short school lectures, and to cover meetings.

Before becoming associated with the Scranton Publishing Co., Inc. in Dec. 1956, he had maintained an office as a Consultant and Technical Editor for five years and during 1954-55 he served as a part time Research Associate in Civil Engineering in the Research Division of New York University's College of Engineering, as well as consulting editor to *Water & Sewage Works*.

Prior to opening his own consulting office in 1951, Dr. Symons had spent 9½ years on the staff of *Water & Sewage Works* first as Associate Editor and later as Managing Editor, in which positions he gained experience eminently fitting him for the position of Editor.

A graduate of the University of Illinois with a B.S. (honors in Chemistry) and an M.S. and Ph.D. in Sanitary Engineering Chemistry, Dr. Symons has had a varied and progressive experience in the fields which this magazine serves: As a filter plant operator and chemist for the Interstate Water Co. in Danville, Ill. where his father was chief engineer; two years of chemical engineering study at the Univ. of Wisconsin; a year as chemist at the Sewage Treatment Plant in Decatur, Ill. under the tutelage of Dr. W. D. Hatfield; six years at the Univ. of Illinois where he also worked for the Ill. State Water Survey as a research chemist under Dr. A. M. Buswell; a year as an Instructor at the Univ. of Illinois, and a year as a research chemist with the Freeport Sulfur Co. In 1935, Dr. Symons served on the staff of Greely and Hansen, Consulting Engineers, on a sewer project in Evansville, Ind. and in 1936 he went to Buffalo, N. Y. as Chief Chemist of the Buffalo Sewer Authority. During World War II, he also served as acting Asst. Supt. until he resigned in 1943 to become Associate Editor of *Water & Sewage Works*.

In Buffalo, Dr. Symons was also associated with Canisius College and the Univ. of Buffalo Med. School.

From 1943 to 1950, Dr. Symons was consultant to the Buffalo Sewer Authority and co-authored the "Buffalo Formula" for charging for industrial wastes. He also authored the plan for abating industrial waste pollution in the Buffalo River.

As a technical writer, he has authored or co-authored nearly 150 bylined articles on research, teaching, and operating of water, sewage and industrial waste plants including his series of articles on "Water Works Practices" and for ten years he authored a monthly column, "Here and There with Doc Symons." He has appeared on many technical association programs.

A licensed professional engineer in N. Y. State, Dr. Symons is certified as a "Sanitary Engineer" by the American Academy of Sanitary Engineering. He also holds a Grade I Operators Certificate for both water and sewage plants in N. Y. State. He is a member of ACS, AIChE, AIDIS, APCA, APHA (Fellow), ASCE, AWWA, FSIWA, NEWWA, and NSPE.

Dr. Symons has served as Secy. of the Buffalo Section of ASCE, Secy. of the West. N. Y. Sect. of AIChE, and Secy. of the West. Sect. of NYSIWA. He is a past President of NYSIWA and a Director in the Federation. At the present time he is Chairman of the FSIWA Publications and Program Committee. At the N. Y. Sect. AWWA meetings he has been conducting a "Water Works School" for the past four years.

He was Editor of the 9th Ed. of "Standard Methods"; Editorial Coordinator of the 2nd Ed. of AWWA "Manual of Water Quality and Treatment"; and Co-Compiler, with W. H. Wisely, of the "20 Year Index of Sewage Works Journal."

Dr. Symons' biography is listed in the Supplement to Who's Who in America, Who's Who in Engineering, Chemical Who's Who, and American Men of Science. He is a member of Phi Kappa Sigma and Alpha Chi Sigma fraternities and the honorary fraternities, Sigma Xi, Phi Lambda Upsilon and Mu San. In 1940 he received the Kenneth Allen Award for Research from the NYSIWA.

Scranton Gillette
Publisher

*A brief mention of this fact was made in the January issue but space did not allow for a full announcement.

The editor's comments

One More Word—

In the January issue, this page carried a short editorial pointing to a number of changes that have been made in this magazine. Also mentioned was the probability of more changes in the future. One planned change is the revival of the editor's page as a regular feature.

For persons who may read these editorials in the future, it should be made clear that this page will be devoted to "the editor's comments" and as such it will be written by the undersigned as an individual in the first person singular. The editorial "we" will be used only when writing with respect to things the magazine is doing or will do. On some occasions, some feature other than "the editor's comments" may appear on this page; when it does it will be under an appropriate label.

A Trend?

Elsewhere in this issue is a brief report on a meeting of the Indiana Sewage and Industrial Waste Assn., held last November in Indianapolis. This is a local state organization that has been in existence for many years. It has functioned somewhat as a local section of the Central States Sewage & Industrial Wastes Assn. but has never been a formal part of the latter organization.

Now, that Indiana group wants to disengage its members from the Central States Association and become, on its own, a full fledged sewage and industrial wastes association and a member of the Federation. In his report on that November meeting Prof. Bloodgood says that two petitions were circulated and signed among the 160 persons attending the meeting. The first of these petitions directed to the CSSIWA requests release of the Indiana members from CSSIWA; the second petition is directed to the Federation requesting affiliation as a member of FSIWA as the Indiana Sewage & Industrial Wastes Assn.

This action is not unexpected. There has been talk of "breaking up" the Central States Assn. for some time and arguments both pro and con have been put forth. Much of the discussion has been casual and off the record. With this action of the Indiana group, the question no longer can be argued in unofficial discussions. If the Indiana group succeeds in its petitions, the Central States Assn. will, of necessity, have to consider the matter of individual state groups versus a single three state group.

Although a native midwesterner, I was never fortunate enough to be a member of CSSIWA, but I have always felt that it had done a great job in the field of sewage treatment. Until recent years, I have believed that a single group in the mid-west served the field well. Now, however, there is ample precedent for the belief that either three or four separate organizations in that area would contribute to a healthy growth of the Federation, and at the same time offer better service to the individuals in these several states.

One has only to review the growth of several AWWA sections, notably Ohio, Pennsylvania, Chesapeake, New Jersey, and others to see that smaller areas served by associations grow more rapidily than do artificially maintained geographic groups.

It will be interesting to see if Indiana is setting a trend in the Federation.

AMA Reaffirms Support of Fluoridation

In 1951, the American Medical Association voiced approval of fluoridation with a relatively simple statement to the effect that fluoridation is safe. In 1956 the Association voted to reexamine the matter in the light of current information and in view of the urging of opponents of fluoridation.

On Dec. 5, 1957 the House of Delegates of the American Medical Association reaffirmed its stand of 1951 when it accepted without reservation or amendment an exhaustive report on the subject. This report concluded:

1. Fluoridation in concentrations of 1 mg/L "has been established as a method of reducing dental caries in children up to 10 years old.

2. "No evidence has been found since the 1951 statement . . . to prove that continuous ingestion of water . . . for long periods by large segments of the population is harmful to general health. . . .

3. "Fluoridation of public water supplies should be regarded as prophylactic (preventative) measure for reducing tooth decay at the community level, and is applicable where the water supply contains less than the equivalent of one part per million of fluoride."

Six years ago, the late Linn Enslow commented editorially on the AMA statement of 1951 as well as the action of the ADA and the National Research Council in approving fluoridation. He concluded that editorial (page 44, January 1952 issue) with these words: "Considering developments of the past five years, now strengthened by the open endorsement of fluoridation by all important dental, medical and public health organizations, it appears to this writer that water supply authorities now opposing fluoridation . . . can ill afford to continue their stand."

In the light of the AMA report of six years later, that statement appears to be even more applicable today.

George E. Symons.

Mishawaka, Indiana Sewage Treatment Plant — **Charles W. Cole & Son, Consulting Engineer**

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- Continuous highest oxygenation efficiency available as required now or in the future.
- Low maintenance, economical Super Clean Air Filter System allows less than 0.09 mg. of dirt per thousand cubic feet of air, minimizing particulate clogging.

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THE COSTLY PROBLEM caused by dripping from this sweating pipe was permanently solved with one easy and inexpensive application of NoDrip Plastic Coating. Sweating pipes, ceilings, air ducts and other metal equipment are also completely protected against rust and corrosion by low cost NoDrip.

NoDrip Plastic Coating acts immediately to insulate and protect. One application adds many years of service life to metal equipment. NoDrip is also resistant to acid, alkali and brine...protects concrete, brick, plaster, tile wood or composition surfaces.

Easy application requires no special equipment or skill. Anyone can apply NoDrip with brush, trowel or spray. Stop your condensation problem now! Get full details without delay.

JW Mortell COMPANY

FREE

32-PAGE NoDrip DATA HANDBOOK

Complete with photographs, charts and technical information to solve your condensation problem. Write today.

Available at leading plumbing and mill supply houses

J. W. MORTELL CO., 599 Burch St., Kankakee, Ill.

Please send my FREE copy of the NoDrip Data Handbook.

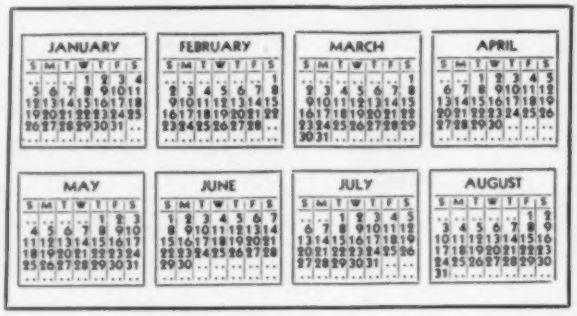
Name_____

Company_____ Title_____

City_____ Zone____ State_____

Meetings

1958



Feb. 5-7—Indianapolis, Ind. *(Sheraton-Lincoln Hotel)*
INDIANA SECTION, A.W.W.A., Secy., Chester H. Canham, 1330 West Michigan St., Indianapolis 7, Ind.

Feb. 12-13—Portland, Maine
MAINE WATER UTILITIES ASSN., Secy., Gerard F. Laurin, 89 Western Ave., Augusta, Maine

Feb. 13—Newark, N. J. *(Hotel Essex House)*
NEW JERSEY SECTION, A.W.W.A., Luncheon, Secy., Albert F. Pleibel, 683 Prospect St., Maplewood, N. J.

Feb. 20—Boston, Mass. *(Hotel Statler)*
NEW ENGLAND WATER WORKS ASSN., Secy., Joseph C. Knox, 73 Tremont St., Boston 8, Mass.

Feb. 24-28—Chicago, Ill. *(Hotel Sherman)*
AMERICAN SOCIETY OF CIVIL ENGINEERS, Exec. Secy., W. H. Wisely, 33 W. 39th St., New York 18, N. Y.

Mar. 2-7—College Station, Tex. *(Texas A & M College)*
TEXAS WATER & SEWAGE WORKS ASSN., Secy., V. M. Ehlers, 2202 Indian Trail, Austin 3, Tex.

Mar. 4—Omaha, Neb. *(Castle Hotel)*
NEBRASKA SEWAGE & INDUSTRIAL WASTES ASSN., Second Great Plains Sewage Treatment Plant Design Conf., Secy., V. J. Lechtenberg, 614 Standard Oil Bldg., Omaha, Neb.

Mar. 12-14—Atlantic City, N. J. *(Traymore Hotel)*
NEW JERSEY SEWAGE & INDUSTRIAL WASTES ASSN., Secy., Michael S. Kachorsky, P. O. Box 68, Manville, N. J.

Mar. 12-14—Salina, Kansas *(Lamer Hotel)*
KANSAS SECTION, A.W.W.A., Secy., Harry W. Badley, Neptune Meter Co., 119 W. Cloud St., Salina, Kan.

Mar. 20—Boston, Mass. *(Hotel Statler)*
NEW ENGLAND WATER WORKS ASSN., Secy., Joseph C. Knox, 73 Tremont St., Boston 8, Mass.

Mar. 20-22—Missoula, Mont. *(Florence Hotel)*
MONTANA SECTION, A.W.W.A., Secy., Arthur W. Clarkson, Asst. Director, Div. of Env. Sanitation, Montana Board of Health, Helena, Mont.
(Jointly With)
MONTANA SEWAGE & INDUSTRIAL WASTES ASSN., Secy., Harvey W. Taylor, c/o Morrison & Maierle, Inc., Helena, Mont.

Mar. 23-26—Atlanta, Ga. *(Dinkler-Plaza Hotel)*
SOUTHEASTERN SECTION, A.W.W.A., Secy., N. M., deJarnette, Engr., Div. of Water Pollution Cont., State Dept. of Health, 245 State Office Bldg., Atlanta 3, Ga.

Mar. 24-26—Fayetteville, Ark. *(University of Ark.)*
ARKANSAS WATER & SEWAGE CONFERENCE, Secy., C. W. Oxford, University of Arkansas, Fayetteville, Ark.

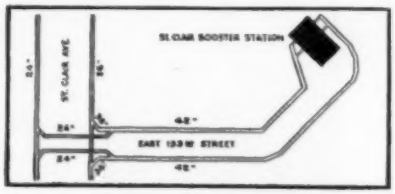
73 Specials Made This Job Look Tough

This job for the City of Cleveland used 73 specials and fittings, with the longest run being only 230 feet. It's the toughest kind of a city installation.

However, Henry B. Sherman, subcontractor, reports that the job went smoothly and according to schedule. Prestressed concrete pipe was used, and it turned out to be a good choice. Regular lengths of concrete pipe, short lengths and specials are all designed for the easiest possible installation.

The project ties a new booster station into two distribution lines (one 36″ and one 24″) running along St. Clair Avenue. Within a 100-foot circle, these specials were used: 6 closures, 6 wyes, 6 butterfly valves, 10 elbows, plus flange adapters, short lengths and bevels. Heavy traffic and close 7-inch clearances complicated the work.

Havens and Emerson were consulting engineers on the job. All the pipe and specials were manufactured in the Dayton, Ohio plant of Price Brothers Company. For information on concrete pressure pipe, write Price Brothers at Dayton, Ohio or Hattiesburg, Miss.



Price Brothers

(Advertisement)

News of Suppliers

De Laval Promotes Bixley

De Laval Steam Turbine Co., Trenton, N. Y., has announced that Donald T. Bixby has been named Assistant Manager of the Standard Products Division. He has been Sales Manager of the division since 1955.

Mr. Bixby joined De Laval in 1945 and served as a sales engineer in the Trenton and San Francisco offices.

Goetz Heads Sales of Water & Sewage Controls for McIntosh

McIntosh Equipment Corp., New York, N. Y., has announced that Frank L. Goetz has been appointed Sales Manager for Water and Sewage Controls.

Mr. Goetz a licensed Professional Engineer, will coordinate sales and promotion of pump controls and telemetering systems to industrial and municipal users. Mr. Goetz was formerly with the Peerless Pump Co.

W. A. Hersey Elected Chairman of Board

Hersey Manufacturing Co., Dedham, Mass., has announced that Walter A. Hersey, president since 1924, has been elected to the position of chairman of the board.

W. A. Hersey

W. P. Hersey

The new president and chief executive officer will be Winthrop P. Hersey, who moves up from executive vice president. Francis P. Hersey continues as vice president, treasurer and secretary.

Rockwell Centralizes Valve Sales, Promotes Five

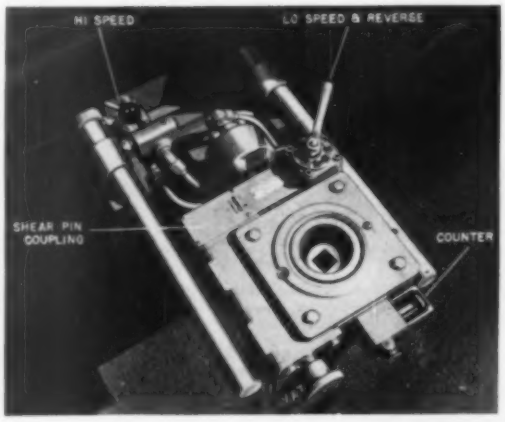
Rockwell Mfg. Co., Pittsburgh, Pa., has announced that in a move designed to centralize and strengthen management of its national Rockwell-Nordstrom valve sales program, the company has promoted five leading sales officials to new sales management posts in Pittsburgh.

The five, all of whom have been named assistants to Herman Gottwald, recently appointed assistant vice president and product manager-Nordstrom valves—include: Thomas I. Stacy, former Houston district sales manager, now assistant product manager-transmission line valve sales; Richard E. Miller, former gas sales supervisor in the New York district, now assistant product manager-valve lubricants and accessories; Jack W. Harris, former Houston senior sales engineer, now assistant product manager-refinery and chemical valve sales. John R. Applegate, former Chicago senior sales engineer most recently attached to the Detroit branch office, now assistant product manager-utilities valve sales; Clyde H. Chronister, former Tulsa senior sales engineer, now assistant product manager-production valve sales.

(CONTINUED ON PAGE 98A

PAYNE DEAN VALVE OPERATOR
NEW—FLUID DRIVE

NO SHAFTS—ALL HYDRAULIC



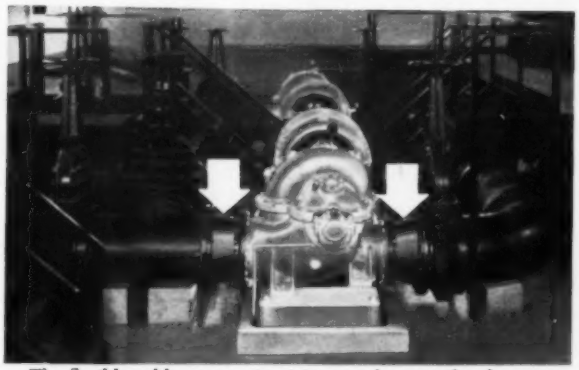
CENTRALIZED CONTROL

Makes Every Valve Power Operated

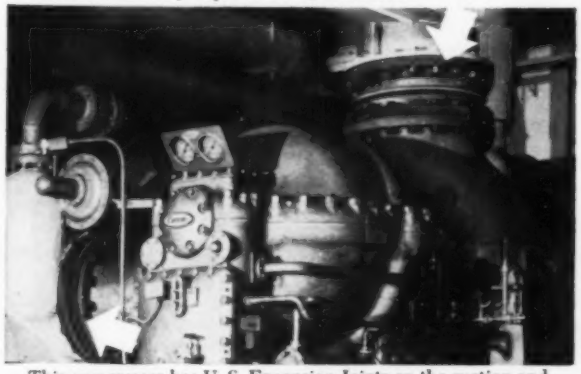
PAYNE DEAN & CO., CLINTON, CONN.

EXPANSION JOINTS

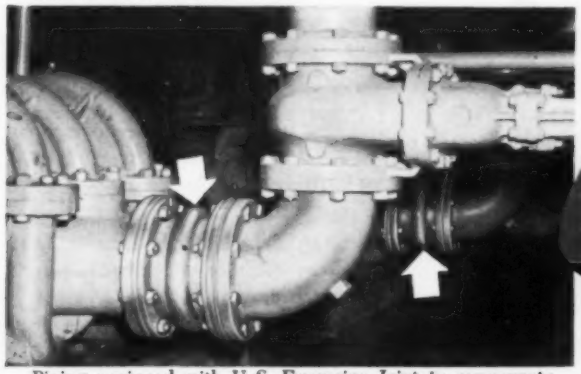
Expanding the Designer's Scope



The flexible rubber expansion joints on the centrifugal pump installations (above) are made by U. S. Rubber. They prevent stresses caused by expansion and contraction.



This compressor has U. S. Expansion Joints on the suction and discharge lines. Like all U. S. Joints, these insulate against the transfer of vibration and noise.



Piping equipped with U. S. Expansion Joint to compensate for any misalignment caused by load stresses, wearing of parts or settling of building.

U. S. Rubber Expansion Joints are resilient and therefore do not, like metal, set permanently when compressed. Constant flexing merely keeps them alive... prevents brittleness.

- They absorb both axial and lateral deflection far more than metal joints. Greater insulation against vibration and pump noises. No electrolysis, corrosion or erosion.
- Handle pressures from 40 lbs. to 125 lbs.
- The outside diameter of the arch is smaller than on metal joints. (Face-to-face dimensions, even with multiple arches, are smaller.)
- Weight is much less. This, plus the fact that no gasket is needed between flanges (metal joints require gaskets) results in an easier installation lowering the cost.

"U. S." was the *first* to develop expansion joints. They are at work in every kind of industry, prolonging the life of equipment in pressure or vacuum pipe systems. Some are still in service, after 30 years of operation. Obtainable at any of the 28 "U. S." District Sales Offices, or write us at Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

For the complete technical information catalogue on the entire line of U. S. Rubber Expansion Joints, contact your nearest "U. S." District Sales Office or write us at Rockefeller Center, New York 20, New York.

Mechanical Goods Division

United States Rubber

Crispin

AIR VALVES

...control air safely and efficiently

These basic advantages are yours when you use Crispin Air Valves . . . simplified construction, easy accessibility, maximum durability, minimum maintenance and efficient operation. You're *safe* with Crispin Air Valves on the job!

Crispin COMBINATION AIR VALVES . . . reduce installation and operating costs where a combination of an Air and Vacuum Valve and a Pressure Air Valve are required.

Crispin NEGATIVE PRESSURE AIR VALVES . . . release air semi-automatically from pipeline siphons to end the danger of throttled pipelines.

Crispin MIDGET AIR VALVES . . . ideal for venting hot water systems and are particularly useful in panel type units—synthetic plunger makes a perfect seal at all times.

AIR CONTROL VALVES FOR OVER 45 YEARS

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MANUFACTURING COMPANY

BERWICK, PENNSYLVANIA

Dept. B

Write, wire or phone for complete information on dependable Crispin Air Valves that keep your pipelines open for safe, economical operation

CUT OPERATING COST SIMPLIFY LIFT SYSTEM

THE BLACKBURN-SMITH WAY...

Blackburn - Smith Pneumatic Sewage Ejectors give you better sewage lifting for less money. Simplest to operate. No complex piping, screens, impellers, shredders, pumps which need constant cleaning and costly maintenance. It will pay you to know the many exclusive features of design and operation of these time-tested units. Backed by 60 years' experience.

Duplex Ejector Twin Units for discharge rates of 30 to 500 g.p.m., heads up to 150 ft. Also made in single units.

BLACKBURN-SMITH MFG. CO., INC.

51 GARDEN ST. HOBOKEN, N. J.

Oldfield 9-4425

N. Y. Tel. BArclay 7-0600

WRITE FOR CATALOG S-55

Shows application, advantages, dimensions and layouts of B-S Pneumatic Sewage Ejectors, single and duplex units. Describes exclusive features of float, electric and pneumatic controls. Tells how to select proper size ejector.

Kotula Appointed Sales Engineer for B-I-F, Chicago

B-I-F Industries, Inc., Providence, R. I., has announced that Louis F. Kotula of Glen Ellyn, Illinois, was recently appointed a sales engineer for the Chicago office.

Mr. Kotula received his BS degree from the University of Illinois in 1942 and has had several years training in business management. He is a Registered Professional Engineer, state of Illinois, and has been a staff engineer in charge of sales and estimating, and a purchasing agent before employment at B-I-F Industries.

Spring Load Occupies New Factory, Office Building

Spring Load Manufacturing Corp., Seattle, Wash., has moved into its new building at 6332 Maynard Ave. The 80′ x 100′ concrete block structure, provides for administration as well as

manufacturing operations. A mezzanine floor with executive offices, directors' room, engineering department and reception room brings the total floor space to 10,000 sq. ft.

The building was completed on schedule and the installation of gas heating equipment was timed to follow closely on the introduction of natural gas to the Seattle area.

Spring Load's former location was at 3610 1st Ave. So.

Sales Staff Transfers at Chicago Bridge

Chicago Bridge & Iron Co., Chicago, Ill., has announced the transfer of three members of the company's sales department.

Arthur R. Simpson, a member of the general sales staff since 1945, has been assigned to the Chicago sales office. Mr. Simpson joined CB&I in 1937 after obtaining a master's degree in engineering from Purdue University.

James R. Mansell has been transferred to the Houston Sales office

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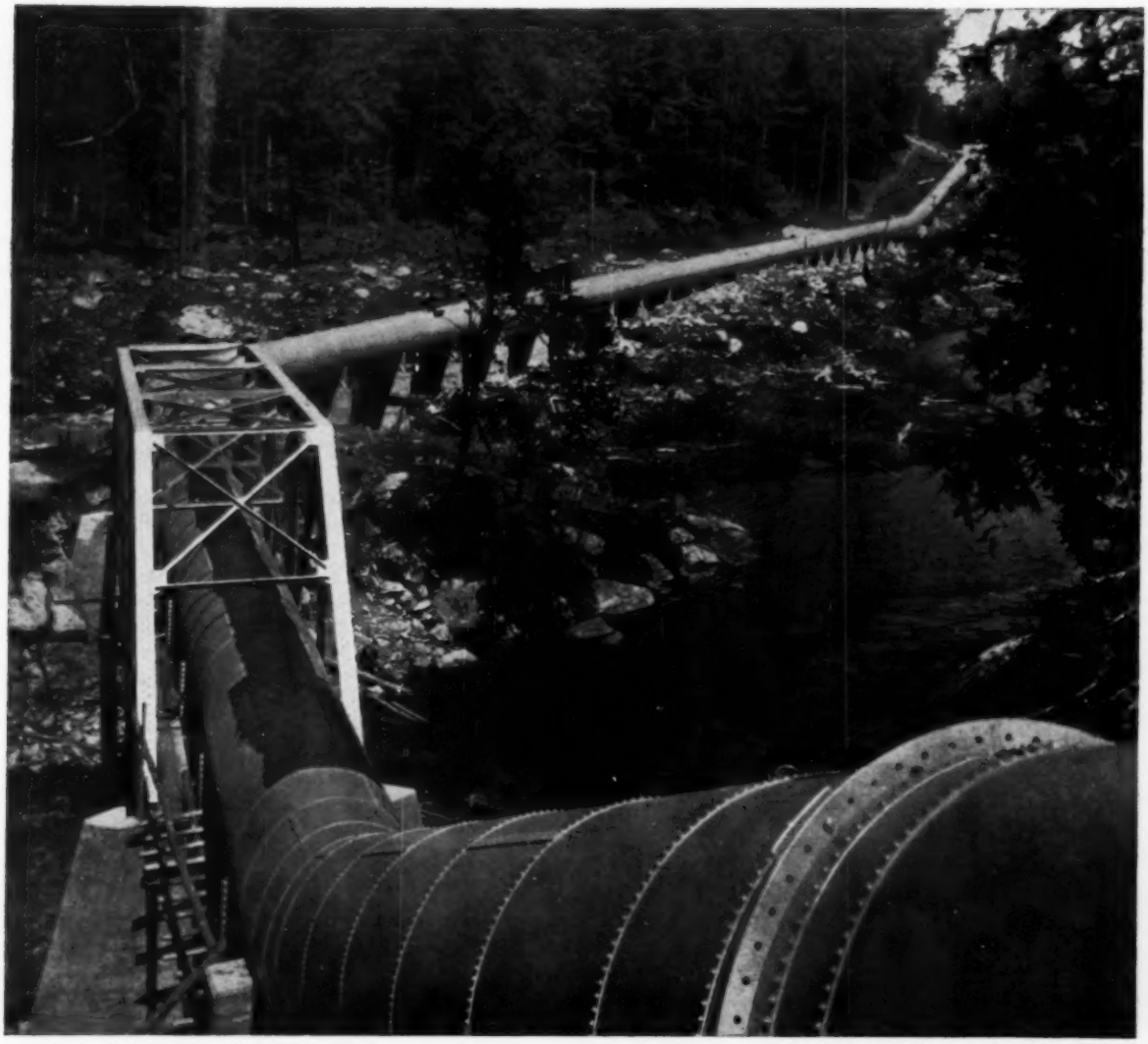


This photograph was taken in 1927.

No trouble in 30 years of constant service

Back in 1927 we furnished 10,235 ft of riveted steel pipe, with saddles, for this 7-ft-diameter penstock to serve Niagara Mohawk Power Corporation's Allen Falls, N. Y., hydroelectric station.

It was fabricated from 3/8-in. to 9/16-in. plates, with riveted girth joints on 10-ft centers. The pipe initially received only a shop coat and a field coat of red lead paint.

This pipe has been in constant service since 1927, operating with a head of 218 ft and a flow of 333 cfs, producing 4600 kw. During 30 years of continuous service there have been no pinholes, no leaks, nor any other damage to the pipe except for the minor loosening of some joints which were damaged when the wooden housing on the surge tank caught fire 20 years ago. These were simply caulked and have given no further trouble.

The pipe has been painted regularly and it looks just as good today as when it was first installed.

Reports like this, coming in from all over the country, indicate that steel pipe gives an extremely high quality of performance under the most demanding service conditions, for many, many years.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

News of Suppliers

CONTINUED FROM PAGE 98A

from the company's Birmingham office. A 1951 engineering graduate of Mississippi State College, Mr. Mansell joined CB&I in 1955.

George M. Rowley, who has been with CB&I since 1955, has moved from the Hillside (N. J.) erection district to the Boston Sales office. Mr. Rowley holds Physics and Civil Engineering degrees from Monmouth College and Case Institute of Technology, respectively.

Schutte & Koerting Forms Instrument Div.; Names Eberly Manager

Schutte and Koerting Co., Cornwells Heights, Pa., has announced the formation of a new Instrument Division to manufacture and market the company's line of precision instruments for measuring fluid rate of flow and other related products. The new division will be housed in a completely new half million dollar plant now nearing completion in Cornwells Heights, Pa.

Ralph W. Eberly

Mr. Ralph W. Eberly, until now Manager of Meter Sales and Engineering, has been appointed manager of the new division. He has been associated with SK for 12 years during which time he served as an engineer in the company's valve, heat transfer, and jet departments, and later a production manager for the company.

W&T Equipment Div. Promotions

Wallace & Tiernan, Inc., Belleville, N. J. has announced the promotion of personnel in the company's Equipment Divisions. Thomas T. Quigley is to be Director—Equipment Divisions; Russell C. Clement is to be Director of Sales for chlorination and chemical feeding equipment; and Donald N. Hale is to be Production Manager.

Mr. Quigley joined Wallace & Tiernan, Inc. in 1940, working first in the Chicago sales office and later transferring to the company's main office in Belleville. During World War II he administered the priorities system for the company's production of important war-time equipment including water purification units for the Armed Forces. He has held a number of responsible positions with the com-

CONTINUED ON PAGE 102A

NOW

LOW-COST AUTOMATIC FLOW RECORDING

Directly Readable Flow Charts

Obtain graphic records of liquid flow directly readable in million gallons per day or gallons per minute over various sizes of Parshall flumes. The same recorder can also be used with charts reading in feet and hundredths to record head or surface fluctuations in lakes, streams, wells. Write for free Bulletin 24.

STEVENS

TYPE F RECORDER

...For Measuring Sewage, Industrial Waste and Other Flows

The planning and efficient operation of any project which involves measurements of flowing liquids is based on flow data which can be obtained with STEVENS Recorders. These instruments are at work compiling data on hydroelectric and flood control projects and in water works, sewage disposal plants, irrigation and industrial installations in all parts of the world.

Experienced technical staff available to supply product information for liquid measurement installations. Write, giving description of project and scope of data desired.

STEVENS DATA BOOK

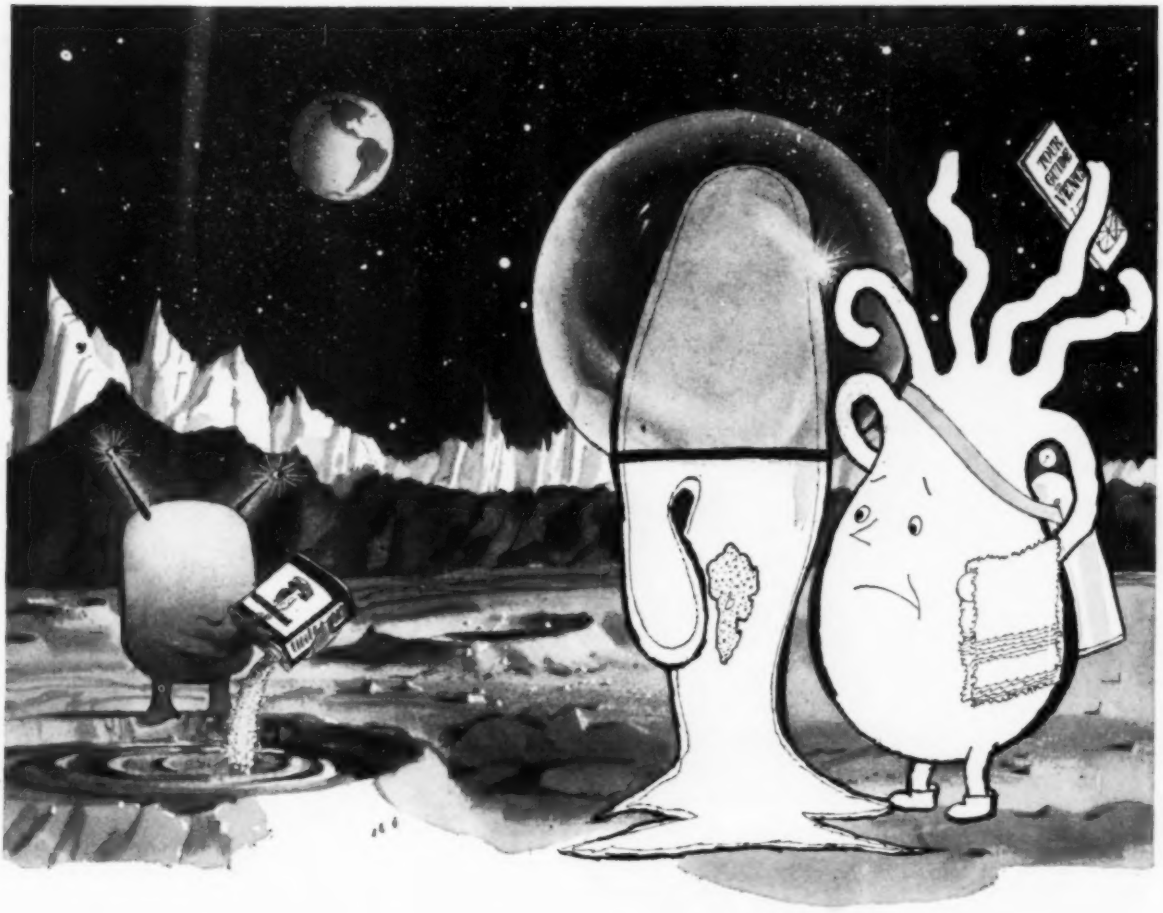
invaluable for your reference file

144 pages of technical data on recorder installations, plus a wealth of hydraulic tables and conversion tables. $1 copy. (No COD's.)

LEUPOLD & STEVENS INSTRUMENTS, INC.

4445 N. E. GLISAN STREET • PORTLAND 13, OREGON

specialists in hydrologic instruments for over half a century



"The word sure gets around, Algie...

Everybody's using PITTCHLOR®!"

Let's face it, fellows! You unwanted microorganisms might just as well have stayed on Earth. The good news about Pittchlor's lethal effect on chlorine-susceptible bacteria and algae has spread to—well, practically everywhere you two could make nuisances of yourselves.

Water works and sewage engineers everywhere are turning to Pittchlor for sure, economical hypochlorination. Designed as an effective and quick chlorinating agent, Pittchlor is a high test calcium hypochlorite containing a minimum of 70% available chlorine. Its exceptional stability allows its chlorine content to be released over prolonged periods of time. This versatile Columbia-Southern product is also useful where floc formation or deodorizing problems exist.

And easy to use? Dry, free-flowing granular Pittchlor can be applied either by automatic feeders or manually. What could be easier? For more information, send today for free folder.

PITTCHLOR available in 2½ lb. (9 per case) and 5 lb. (6 per case) resealable cans —and 100 lb. drums

Stocked by leading jobbers everywhere

COLUMBIA-SOUTHERN CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER · PITTSBURGH 22 · PENNSYLVANIA

DISTRICT OFFICES: Cincinnati • Charlotte Chicago • Cleveland • Boston • New York St. Louis • Minneapolis • New Orleans Philadelphia • Houston • Pittsburgh Dallas • San Francisco
IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division

GUNITE does it 2 times as fast at 1/2 the cost

"Gunite" is the modern process (sand and cement applied pneumatically) for repairing, constructing, lining:

- Reservoirs
- Dams
- Filter Plants
- Sewage Disposal Plants
- Tanks
- Stadiums
- Bridges
- Sea Walls
- Swimming Pools, etc.

Write FOR MORE INFORMATION, INCLUDING 48 PAGE "GUNITE" BOOKLET.

PRESSURE Concrete Co.

FLORENCE, ALA. 1555 Helton Street

OTHER OFFICES IN

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NEWARK 5, N. J. 193 Emmet Street

Reduce Installation and Maintenance Cost

ROCKWELL *Butterfly* VALVES

Meet AWWA Specs. C504-55T

Made in all standard sizes; natural or synthetic rubber seat with clamping segments, or spool type rubber liner extending over flange faces. Manual or automatic control for convenient, easy operation.

- Drop-Tight Shutoff
- Minimum Restriction to Flow
- Minimum Pressure Drop
- Non-Clogging
- Compact—Lighter Weight
- Reduced Installation Space
- Lowest Installed Cost
- Less Maintenance

Let Bulletin 574 help you figure on your next water works job.

W. S. ROCKWELL COMPANY

2828 ELIOT STREET • FAIRFIELD, CONN.

Sales Representatives in Principal Cities

pany including Advertising Manager, Assistant to the President and Operational Analyst, and most recently as Executive Asst. to the Vice President.

Mr. Clement has been associated with Wallace & Tiernan, Inc. since 1924. In that year he was hired as a field engineer, working in the company's Pittsburgh office selling equipment for water and sewage treatment. Most recently he has held the position of Manager of Field Sales and Service, being responsible for the operation of Wallace and Tiernan's 47 sales offices located throughout the United States.

Mr. Hale joined Wallace & Tiernan, Inc. in 1936. He has had experience in sales, sales engineering and production of many of Wallace & Tiernan's diversified operations.

Badger Meter Opens Sales and Service Center

Badger Meter Mfg. Co., Milwaukee, Wis., has announced the establishment of a new sales and service

center headquarters at 19400 South Susana Road, Rancho San Pedo Industrial Area, Los Angeles 59, Calif. Badger previously was located at 2940 Leonis Boulevard, in Los Angeles.

The company has also announced the appointment of Henry DePagter as Western District Sales Manager. Mr. DePagter is a Badger veteran, having started as a draftsman in Milwaukee and advancing to the position of chief engineer. He served as chief engineer from 1950 to 1953, when he was appointed plant manager of the newly established operation in Los Angeles.

The new sales and service center will have greater floor space and better facilities for more complete service to customers in the states of California, Oregon, Washington, Idaho, Nevada, Arizona, New Mexico, Utah, Wyoming, and Colorado.

CONTINUED ON PAGE 104A

How safe?

Life-giving fluid . . . *or death-dealing poison?*

Better than anyone else, you know what it takes to keep that clear, sparkling water *safe* for your community. Your skill is in that glass.

So is the skill of your chlorine supplier. How solidly can *you* count on the chlorine you buy—its purity; packaging; the promptness with which it reaches you when you need it?

We're in that glass, too. The very first liquid chlorine made in this country carried the NIALK® label. Today, as always, when you buy NIALK chlorine, you get a 100% pure product in clean, well-conditioned containers with safe, tested, smooth-functioning valves.

You can order it in 100- and 150-lb. cylinders, in multi-unit cars of ton containers, and in tank cars of 16-, 30-, and 55-ton capacity.

Your inquiry will receive our prompt attention.

For safe, efficient, chlorine handling in your plant, write for these two helpful timesavers:

1. *New Hooker chlorine wall chart* lists the most important precautions for handling chlorine; tells what to do in case of accident.

2. *Complete 76-page chlorine manual* gives detailed engineering and safety information. It is fully illustrated with diagrams of equipment for handling chlorine.

HOOKER ELECTROCHEMICAL COMPANY
1702 Union Street, Niagara Falls, N. Y.

HOOKER CHEMICALS PLASTICS

DUREZ® PLASTICS DIVISION • NORTH TONAWANDA, N. Y.
NIALK® CHEMICALS • NIAGARA FALLS, N. Y.
OLDBURY® CHEMICALS • NIAGARA FALLS, N. Y.

Sales Offices: Chicago, Ill.; Detroit, Mich.; Los Angeles, Calif.; New York, N. Y.; Niagara Falls, N. Y.; Philadelphia, Pa.; Tacoma, Wash.; N. Tonawanda, N. Y.; Worcester, Mass. *In Canada:* Hooker Chemicals Limited, N. Vancouver, B. C.

News of Suppliers

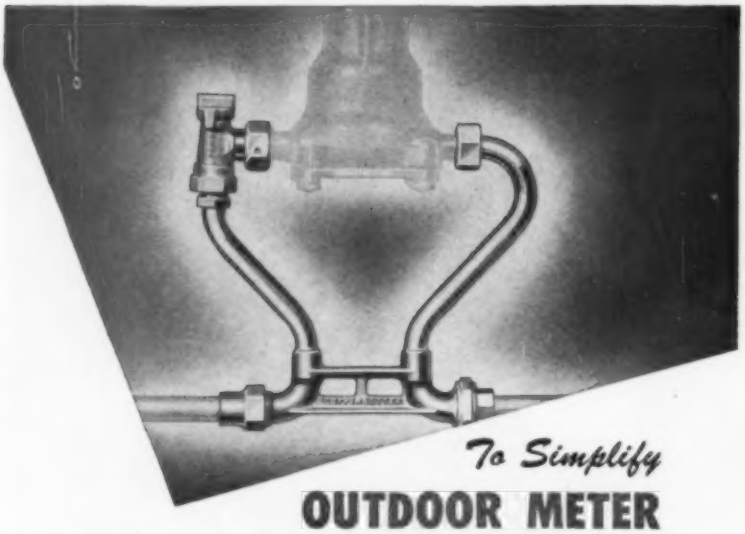
CONTINUED FROM PAGE 102A

Davey Compressor Promotes Darling

Davey Compressor Co., Kent, Ohio, has announced the appointment of L. W. Darling as general sales manager.

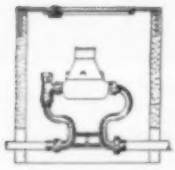
Mr. Darling has been affiliated with Davey for the past 12 years. He was formerly assistant vice president, a position he will retain in addition to his new duties. His Davey experience also includes service as manager of government sales and as midwestern district manager in charge of the company's Chicago office. He was likewise formerly New England district manager.

A graduate of Duke University, School of Engineers, Mr. Darling will direct the activities of 12 district offices and more than 150 direct factory distributors. He will supervise sales of the 3 Davey operating divisions which produce portable compressors, air tools, rotary drill rigs and industrial compressors.



To Simplify

OUTDOOR METER SETTINGS



With a Ford Coppersetter, or a Ford Linesetter, you can eliminate as many as six pipe joints, two risers, four ells, one pipe coupling, one meter coupling and possibly a valve. In so doing, you raise your meter from 3″ to 36″ above your service line, depending upon the model used. Positive alignment is maintained when meters are changed.

Copper and bronze construction add extra years of life. Hydraulic efficiency is improved.

The economy is obvious . . . . and the savings are real. Send for free catalog. It contains complete information.

FOR BETTER WATER SERVICES

FORD

THE FORD METER BOX COMPANY, INC. Wabash, Indiana

New Rockwell Valve Plant at Kearney, Neb.

Rockwell Manufacturing Co., Pittsburgh, Pa., has announced that their new 180,000 square-foot plant at Kearney, Nebraska, is now in limited production.

Approximately 75 employees are already at work in the new plant which manufactures Rockwell-Nordstrom lubricated plug valves. The new plant, which cost more than $2 million, is a one-story brick and tile structure located on a 52-acre plot. Valves will be completely machined, assembled and tested here.

The first major manufacturing company to enter this predominantly agricultural community, Rockwell has been training key personnel in a small leased training plant in Kearney for the past 12 months in order to shorten the time required to put its new plant into full-scale operation.

Hydraulic Test Laboratory

Sparling Meter Company, Inc., El Monte, Calif., has recently installed an elaborate facility to volumetrically test meters from the smallest capacity meters to the largest irrigation meters quired for main canals.

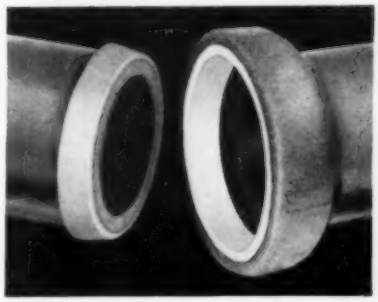
The test laboratory can handle flows up to 35,000 gpm or 80 cubic feet per second. Tests are made of meters up to 72″ in size in the proper tube size and calibrated over the rated flow range, simulating performance conditions encountered in the field. Propellers for meters larger than 72″ can also be calibrated.

Two test tanks, one of 75,500 gallons and one of 7,500 gallons, are utilized. Water level changes are automatically indicated on dial registers which read directly in terms of volume. Change in tank volume is compared with the metered volume and any correction necessary is made in

CONTINUED ON PAGE 106A

lower installation costs FIVE WAYS with longer, stronger AMVIT Clay Pipe

Outstanding Mechanical Joint of Plasticized Resins of Polyvinyl-Chloride Gives Lower Cost-In-Place



A million dollar expansion program to increase production facilities for Amvit® was completed earlier this year. New horizontal extrusion machines now manufacture pipe in over four feet lengths.

Longer lengths lower installation costs, reduce the number of joints, lessen the number of pipe sections to be handled. *Here's how you can save on installation with Amvit:*

1 SAVES LABOR

No other materials such as caulking, joint compounds, hot pots or ladles are needed to make the Amvit Joint. The joint is on the pipe delivered to the job ready for use. Nothing else is needed. Just push the pipe together and the joint is complete.

2 IMMEDIATE BACKFILLING

As soon as the joint is made, backfilling can start. No need to wait for unnecessary delays caused by bad trench conditions, high-water table, unstable ground or running sand. Barricades can be removed and streets opened days sooner.

3 QUICK TESTING

No need to wait days to see if a line has passed test. A look at the completed joint will tell. Thus, engineers can inspect and accept the line allowing the contractor to receive payment quicker.

4 PERMITS DEFLECTION, ABSORBS SHOCKS

Amvit is made from a plastic which has many characteristics similar to rubber. It is pliable, permitting deflection without leakage. It is resilient, can absorb shock and vibration. This allows for settlement of pipe in poor ground conditions after backfilling.

5 COMPLETE FITTINGS

Amvit is furnished on all standard fittings, as well as pipe. This will permit a uniformly tight line from house wall to treatment plant.

Amvit line being installed in Amherst, Ohio

For more information on how Amvit can help cut your sewer project costs, write or call American Vitrified Products Company, National City Bank Building, Cleveland, Ohio, or our office nearest you.

SINCE 1900

AMERICAN

American Vitrified Products Company

CLEVELAND OHIO

MANUFACTURERS OF: Clay Pipe, Flue Liners, Clay Liner Plates and Concrete Pipe.

® T. M. Registered.

Plants Across the Nation . . . Brazil, Indiana · Chicago, Illinois · Cleveland, Ohio · Crawfordsville, Indiana · Detroit, Michigan · East Liverpool, Ohio Fenton, Michigan · Grand Ledge, Michigan · Lisbon, Ohio · Los Angeles, California · Milwaukee, Wisconsin · South Bend, Indiana · Uhrichsville, Ohio

News of Suppliers

CONTINUED FROM PAGE 104A

the register drive gears within the meter or meters under test.

Within the indoor test area, full instrumentation permits scientific checking of water volume of several meters simultaneously at various flow rates which can be registered by each meterhead or through chart recording instruments.

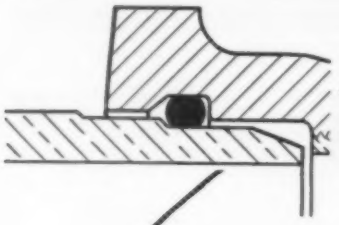
This laboratory is claimed to be the largest single facility in the U. S. for testing irrigation meters.

Hagan Promotes Bishop

Hagan Chemicals & Controls, Inc., Pittsburgh, Pa., has announced that Louis C. Bishop has been named district manager for the Pittsburgh sales office.

As district manager, Mr. Bishop will direct sales of Hagan instruments and control systems, Calgon industrial chemicals and Hall Laboratories' consulting services in the Tri-state area and most of western Pennsylvania.

Mr. Bishop started with Hagan in 1941 as a laboratory technician and has served successively as a Hall service engineer, headquarters staff engineer and Pittsburgh district office sales engineer.



RING-TITE JOINT

VALVES & HYDRANTS FOR

RING-TITE ASBESTOS-CEMENT PIPE LINES

M H

For installing M&H Valves and Hydrants in a Ring-Tite asbestos-cement pipe line, specify valves or hydrants with Ring-Tite end connections. The connecting ends of the valve or hydrant are especially designed to enclose a round rubber ring gasket when the end of Class 150 Ring-Tite pipe is inserted, as illustrated in sketch above. Non-rising-stem gate valves with Ring-Tite end connections are available either with conventional or "O"-Ring stuffing box.

Installation is easy and simple. Unskilled workmen can make up the connection quickly and economically. No special fittings nor extra joint materials are required. The joint is tight against low or high pressure. For full information, wire or write

M&H VALVE AND FITTINGS COMPANY
ANNISTON, ALABAMA

SUBSIDIARY OF W WALWORTH

Mayfield Named Mgr. Tar Products Div. of Barrett

Barrett Division, Allied Chemical & Dye Corporation, has announced the appointment of P. B. Mayfield as Manager of Industrial Tar Products Sales.

Mr. Mayfield entered Barrett's employ in 1949 as Consultant. Prior to that time he was with International Creosoting & Construction Co. of Galveston, Texas, in the Manufacturing and Sales Departments, later becoming Manager of Research and Development.

Mr. Mayfield is a graduate of Texas A & M College, with a B.S. degree in Chemical Engineering. His home is in Chatham, N. J.

De Laval Opens New Office, Appoints Teren Manager

De Laval Separator Co., Poughkeepsie, N. Y., has announced the opening of a new district office at 121 Coulter Ave., Ardmore, Pa.

Mr. George G. Teren, Jr., formerly a sales engineer working out of De Laval's Pittsburgh office, will take over as manager of the new office. Mr. Teren joined De Laval in 1950 as a sales trainee, and currently resides in Haverstown, Pa.

Alexander Joins Precision Pump

Precision Chemical Pump Corporation, Waltham, Mass., has announced the appointment of John H. Alexander, Jr. to the position of Assistant Sales Manager.

Mr. Alexander brings to his new position a substantial background of

CONTINUED ON PAGE 108A

As Simple As A Stopper In A Bottle -->

ALTITE JOINT

By APCO

Advantages Of An ALTITE JOINT!

Permanently flexible and Bottle-Tight joints reduce maintenance cost to a minimum.

Longer lengths and ease of installation yield added footage laid per hour even with unskilled labor.

Simple design—no ridges or grooves in gasket seat to collect dirt and complicate cleaning the seat in wet or dry trenches.

Gasket is **REVERSIBLE**—Cannot be installed wrong.

Four Operations As Simple As Falling Off a Log—

Insert Rubber gasket in bell end of pipe—you can't put it in wrong—A child can do it.

Wipe on a small amount of special lubricant—This reduces friction.

Insert plain beveled end of pipe—there are no grooves, ridges or tips on gasket to interfere with smooth insertion.

Small amount of pressure required to force plain end to bottom of socket—Your simple, time saving joint is completed.

For The Best Connection You'll Ever Make—Contact APCO

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PROFITABLE Sewage Sludge Disposal

Every sewage disposal plant has a by-product—sewage sludge—that must be disposed of. Some plants burn their dried sludge in expensive incinerators—wasting a valuable, readily saleable product and missing a chance to write-off a large portion of their operating costs.

Many municipalities dump the dried sludge cake into the hopper of their Royer Shredder and turn this by-product into a tidy profit. "Royerated" sludge is desired as a fertilizer by florists, nurserymen, golf courses, professional gardeners and the home owner alike. It is a highly desirable plant food, high in Nitrogen and Phosphoric Acid, both essential plant food elements. Unlike many other fertilizers, "Royerated" sewage sludge cake is sterile, cannot carry weeds, will not "burn" even the most tender new grass seedlings.

As a result of increased interest in sewage sludge as a source of municipal income, the Royer Foundry & Machine Company has re-edited and re-issued their popular "Sewage Sludge Utilization Datalog," describing this process in detail. We invite you to write for a free copy. It pictures and describes the Royer Shredders that have made sewage sludge an asset to communities all over America.

Please send me a copy of your **new** edition of the information-packed "Sewage Sludge Utilization Datalog."

Name_____ Title_____

Plant_____

City_____ Zone____ State_____

We dispose of our dried sewage cake by_____

_____

☐ I am interested in a demonstration of the Royer Shredder at work.

ROYER FOUNDRY & MACHINE CO.

ROYER

170 PRINGLE STREET
KINGSTON, PENNA.

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General offices and works W. Medford Sta., Boston, Mass.

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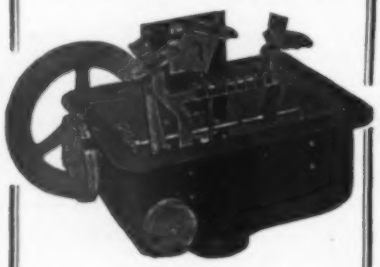
W. S. DARLEY & CO., Chicago 12

ROTO-TROL



RF-2

WITH ALTO-TROL

This 2-pump RF-2 Roto-Trol assures equal use and wear of both pumps. Each pump is operated on alternate starting cycles.

The RF-2 operates both pumps together, when required. RF-2 installations give dependable service year after year, with the minimum of attention.

Write for full data

WATER LEVEL CONTROLS DIVISION

HEALY-RUFF COMPANY

783 Hampden Ave., St. Paul 4, Minn.

training and valuble experience. He received his BA degree from Yale University in 1951. Following graduation from Yale, he served as an Army Lieutenant in Korea and was later associated with the Public Relations and Advertising department of the Aluminum Company of America. In 1957 he received the degree of Master in Business administration from Harvard University's Graduate School of Business Administration.

Executive Election at Chain Belt

Chain Belt Co., Milwaukee, Wis., has announced the election of an Executive Vice President and three new Vice Presidents. O. W. Carpenter, formerly Vice President, Construction Machinery and Finance, is now Executive Vice President, with direct responsibility for current operations of the Company. He joined Chain Belt Company in 1943 as Assistant to the Vice President, was elected Vice-President and Director in 1948, and advanced to Vice President—Construction Machinery & Finance in 1956.

W. C. Messinger, as Vice President—Construction Machinery Section, has been promoted from Manager, Construction Machinery Division, Milwuakee.

E. M. Rhodes, as Vice President—Industrial Equipment Section, has previously been Manager of this Section. He has executive responsibility for the five Industrial Divisions comprising the Industrial Equipment Section.

G. H. Woodland, as Vice President—Marketing, is advanced from General Sales Manager—Industrial Equipment Section. He will be responsible for the Field Force, Sales Policy, Marketing Methods and Distribution of the products of the Industrial Equipment Section.

Miller and LeMaster Join Hays Mfg.

Hays Manufacturing Co., Erie, Pa., has announced that Henry E. Miller, Jr., and Stanley D. LeMaster, Jr., have joined the company as salesmen.

Mr. Miller will sell for the General Products Div., in Missouri, Aransas, Oklahoma and Kansas. Prior to his association with Hays. Mr. Miller sold for the Rohan Co., Waco, Texas, and Well Machinery & Supply Co., Fort Worth, Texas.

Mr. LeMaster will work under Michel L. LeJeal, in the Pittsburgh area. He comes to Hays after many years with Amstan Supply Div., American Radiator & Standard Sanitary Corp.

"Well, you insisted on putting those XYZ fittings in the line, even after you heard that ABC salesman's story."

WANTED

We have an excellent position open for a Sanitary Engineer interested in sales engineering in the Sunny South with progressive company manufacturing a complete line of sanitary equipment. For details send brief resumé. The Eimco Corporation, 3140 Fayette Avenue, Birmingham 8, Alabama.

WANTED

Experienced Engineers to prepare plans for Water Filtration Plants and/or Sewage Treatment Plants. State experience, salary requirements and when could report. Box 1100, Water & Sewage Works, 185 North Wabash Ave., Chicago 1, Illinois.

Equipment News

CONTINUED FROM PAGE 23A

Low Pressure Propeller Type Meter

223

Sparling Meter Company, El Monte, Calif., has developed a propeller type low pressure line meter for metering large water volumes in closed conduits ranging in size from 4" to 72". It is of the velocity type equipped with a propeller actuated by the kinetic energy of the moving water.

Pressures up to 230-foot can be efficiently handled. Use of the propellers precludes sandy water conditions as the bearings and the propeller is self-cleansing and self-flushing. The propeller actuates meter mounted totalizing register and/or auxiliary flow recording instruments.

Automatic Colorimetric Titrations

224

Fisher Scientific Co., Pittsburgh, Pa., has developed the Colorimetric Titration Kit that enables the busy chemist to perform titrations using colorimetric endpoints without the uncertainties of the human eye.

The kit consists of a magnetic stirrer, for sample mixing (stirrer is completely concealed inside the Electrophotometer except for the switch) and a hinged lid assembly for introducing a standard or micro buret into the cell compartment. Standard 60-ml and 29-ml cells, even 100-ml beakers can be used for titrations.

By the proper choice of electrophotometer filters, the operator can measure the absorbance of the sample during titration. A sudden change in absorbance indicates the endpoint; the exact endpoint is obtained graphically from the intersection of two straight lines on a plot of ml titrant vs absorbance.

WANTED
SEWAGE PLANT SUPERINTENDENT
Arcata, Humboldt County, California, to take charge of 3 MGD primary plant. Do lab work. Experienced man with Class I or II CSIWA Ticket preferred but not mandatory. Salary open. Application forms may be obtained from City Clerk, Arcata, California. Deadline for applications, February 28, 1958.

For Important Information
on Products and Services
see the 1957-1958
WATER & SEWAGE WORKS
REFERENCE and DATA NUMBER

The following firms have information of interest to you in the 1957-58 REFERENCE and DATA NUMBER

Airkem, Inc.
Alabama Pipe Co.
Allis-Chalmers
Amercoat Corp.
American Vitrified Prod. Co.
American Well Works
Anthracite Equipment Co.

Bailey Meter Co.
Beaumont Birch Co.
Bethlehem Steel Co.
B-I-F Industries, Inc.
Borden Metal Products Co.
Builders-Providence Inc.
Byron Jackson Pumps, Inc.

Chain Belt Co.
Chicago Bridge & Iron Co.
Chicago Pump Co.
Clarksville Foundry & Machine Works
Jas. B. Clow & Sons (Iowa)
R. D. Cole Mfg. Co.
Columbia Southern Chem. Co.
Combustion Engineering, Inc.
Cook Well Strainer Co.

Dorr-Oliver, Inc.

Fischer & Porter Co.
Foster Enineering Co.

General Chem. Div.
Allied Chem. & Dye Corp.
General Filter Co.
Golden-Anderson Specialty Valve Co.
Graver Tank & Mfg. Co.
Graver Water Conditioning Co., Inc.

Hardinge Co., Inc.

Infilco, Inc.
Ingalls Iron Works Co.
International Minerals & Chemical Corp.
Iowa Valve Co.

Jeffrey Mfg. Co.
Johns-Manville
John Wiley Jones Co.

Komline-Sanderson Engineering Corp.

Link-Belt Co.
Ludlow-Rensselaer Valve Mfg. Co.

M & H Valve & Fittings Co.
Millipore Filter Corp.
Morse Boulger Destructor Co.
Multiplex Mfg. Co.

Natco Corp.
National Clay Pipe Mfrs., Inc.
National Power Rodding Corp.
Neptune Meter Co.
Nichols Engineering & Research Corp.

Olin-Mathieson Chemical Co.
Omega Machine Co.

Pacific Flush Tank Co.
Pennsalt Chemical Corp. (Western Div.)
Permutit Co.
Phipps & Bird, Inc.
Henry Pratt Co.
Presstite-Keystone Engineering Products Co.
Pressure Concrete Co.
Proportioneers, Inc.

Rensselaer Valve Co.
Roberts Filter Mfg. Co.

Schramm, Inc.
Simplex Valve & Meter Co.
Smith & Loveless, Inc.
S. Morgan Smith Co.
A. P. Smith Mfg. Co., Inc.

Tennessee Corp.

U. S. Pipe & Foundry Co.

Walker Process Equipment, Inc.
Wallace & Tiernan, Inc.
Washington Aluminum Co.
Water Seals, Inc.
Western Machinery Co.
White Diesel Engine Div.
Worthington Corp.

Yeomans Bros. Co.

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SCRANTON GILLETTE PUBLICATIONS

WATER & SEWAGE WORKS • **INDUSTRIAL WASTES**
REFERENCE and DATA NUMBER • **MODERN HIGHWAYS**

Helpful Bulletins *Available Free*

Blowers, Gas Pumps, Vacuum Pumps

225

Sutorbilt Corp. a subsidiary of Fuller Co., Maywood, Calif., has just released a new eight-page, two-color bulletin describing **Sutorbilt Blowers, Gas Pumps and Vacuum Pumps.**

Cushioned Valves

226

Golden-Anderson Valve Specialty Co., Pittsburgh, Pa., has just published a 4-page bulletin on Golden-Anderson **Cushioned Valves in Action.**

Vitrified Clay Products

227

Robinson Clay Product Co., Akron, Ohio, has just published a completely new, four-page technical bulletin on **Vitrified Clay Products.**

Saunders Valves

228

Conoflow Corp., Philadelphia, Pa., has just issued a new bulletin describing the company's complete line of **Air-Operated Saunders Patent-Type Valves.**

Meter Diaphragm Pumps

229

Hills-McCanna Co., Chicago, Ill., has just published a new two-color, four-page bulletin describing the new **McCannameter.**

The Story of Diamond Chemicals

230

Graphically depicting in word and picture its diverse, growing family of chemical products for industry and agriculture, Diamond Alkali Company, Cleveland, Ohio, has just published the fifth edition of **The Story of Diamond Chemicals—Chemicals You Live By.**

Sho-Rate Rotameters

231

Brooks Rotameter Co., Lansdale, Pa., has just published a bulletin on the new, low cost **Sho-Rate Rota-meter** with the 150 mm scale length for greater readability.

Electric Brakes and Clutches

232

Warner Electric Brake & Clutch Co., Beloit, Wis., has released a new catalog digest giving easy to read facts about **Electric Brakes, Clutches** and controls for miniature mechanisms or high torque machine drives.

Sewer Construction Film

233

Clay Products Association, Chicago, Ill., has available a new sound, color film presenting the latest and most efficient methods of sewer construction.

Veriflow Meters

234

Hays Corp., Michigan City, Indiana, has just published an 8-page catalog on **Veriflow Meters and Veritrol Controls.**

Valve Lubrication, Maintenance Chart

235

Rockwell Manufacturing Company, Pittsburgh, Pa., has released a new 19-by-24-inch, three color chart containing **Maintenance and Lubrication** information for Rockwell-Nordstrom lubricated plug valves.

Enclosed Gear and Variable Speed Drives

236

Link-Belt Co., Chicago, Ill., has announced that for easy reference in selecting **Stock Drives** available for immediate shipment from the many Link-Belt warehouses throughout the U. S., folder 2642 is being distributed by district offices and authorized industrial distributors.

Planning for New Sewers

237

Clay Products Assn., Chicago, Ill., has just published a brochure **Planning For New Sewers** that describes the values and benefits of properly installed and adequate sanitary sewer systems.

Vertical Non-Clog Pumps

238

The Economy Pump Div., of C. H. Wheeler Manufacturing Co., Philadelphia, Pa., has just published a new four-page, two color catalog describing two types of **Vertical Non-Clog Pumps.**

Water Control Gates

239

S. Morgan Smith Company, York, Pa., has just released a bulletin on **Water Control Gates.** This sixteen page technical bulletin outlines the several basic types of gates and their applications. Discharge curves are shown for preliminary sizing, and specifications are included.

Motor Controls Bulletin

240

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has just released a bulletin on **Motor Controls** giving the latest design features in Allis-Chalmers front access, high voltage starters for 2300 to 5000 volt motors which provide maximum accessibility, protection, performance and space economy.

Chemical Feeder Catalog

241

Manzel, a division of Houdaille Industries, Inc., Buffalo, N. Y., has just released a comprehensive new catalog on its line of **Chemical Feeders.**

Non-Clog Pumps

242

Economy Pump Div., C. H. Wheeler Mfg. Co., Philadelphia, Pa., has released a new four-page, two-color catalog describing their complete line of **Horizontal Non-Clog Pumps.**

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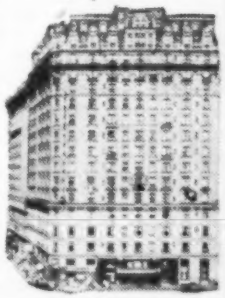

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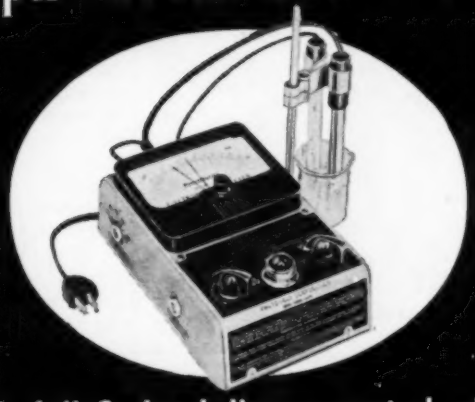

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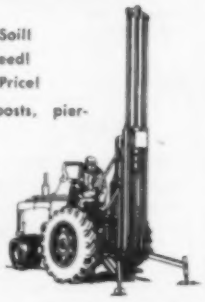

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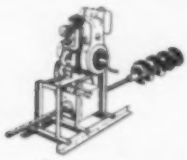

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*Builders-Providence, Inc. 12A

C

Calgon Co. 48A
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Carter Co., Ralph B. 32A
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*Clow & Sons, James B. 33A
Crane Co. 49A

D

Darley & Co., W. S. 108A
De Zurik Corp. 16A
*Dorr-Oliver, Inc. ..... Inside Back Cover

E

Ellis & Ford 13A
Electro-Rust Proofing Corp. 11A
Engineering Controls 21A

F

*Fischer & Porter Co. 26A
Ford Meter Box Co. 104A

H

Hamilton-Kent Mfg. Co. 30A
Healy-Ruff Co. 108A
Hersey Manufacturing Co. 25A
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Hydraulic Development Corp. 108A

I

*Infilco Inc. 24A
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J

*Jeffrey Mfg. Co. 40A

K

Keasbey & Mattison Co. 44A
Kerrigan Iron Co. 17A-18A

L

Layne & Bowler ..... Back Cover
Leopold & Co., F. B. 5A
Leupold & Stevens Instr. Co. 100A

M

*M & H Valve & Fittings Co. 106A
Minneapolis-Honeywell Reg. Co. 42A
Mueller Company 43A
Mortell Co., J. W. 94A
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N

*National Clay Pipe Mfrs., Inc. 1A
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O

Oliver Corp. 20A
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R

Rockwell Co., W. S. 102A
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S

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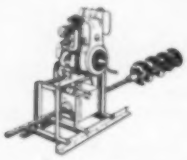

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D

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L

Layne & Bowler ..... Back Cover
Leopold & Co., F. B. 5A
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*M & H Valve & Fittings Co. 106A
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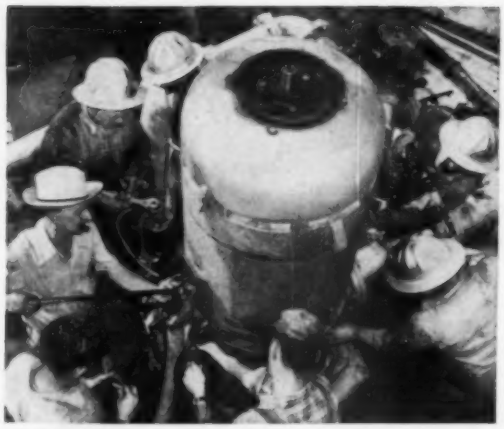

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